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TO CORRESPONDENTS.

A Tyro in Gas Matters *will find some of his inquiries answered in the next number. Wigan cannel requires from one-half to six-tenths of its coke as fuel for its distillation.*

L. M. *sends us a copy of the* "Ceneen," *a paper published in the Mauritius, from which it appears that our Journal has reached that tropical island, and awakened a desire for the introduction of gas,—an excellent opening for an unemployed gas engineer.*

NOTICE TO AMERICAN READERS.

Complete series of the Journal may be had of Messrs. D. Appleton and Co., 200, Broadway, New York, to whom all subscriptions for the United States, after the 10th of January, 1851, must be paid.

NOTICES.

The subscription is 10s. per annum if paid in advance, or 12s. on credit, payable in two sums of 6s. each, due in June and December of each year. All subscriptions commence from the 10th of January.

All communications and orders for Advertisements to be addressed to the Editor, 32, Bucklersbury, London.

Back numbers exceeding three months' date will in future be charged double price, unless six or more consecutive numbers are taken at the same time. Nos. 6 and 18 are out of print.

The Editor will be particularly obliged by his friends forwarding to him Notices of all Meetings, Trials, or Appeals which it may be interesting to the Gas World to have reported.

AVIS

A MM. les Exposants étrangers de l'Exposition de l'année 1851.

Le Rédacteur du Journal d'Eclairage au Gaz a l'honneur d'annoncer aux inventeurs et propriétaires d'appareils pour la fabrication, distribution, et les emplois à l'usage du gaz, qu'il est pret a se charger de leurs intérêts, pour la grand exposition internationale de l'année prochaine. S'adresser, franco, au Redacteur du Journal, 32, Bucklersbury, à Londres.

Circular to Gas Companies.

The Editor may be consulted on all subjects connected with the supply and manufacture of gas, or the alteration and improvement of gas apparatus, and the construction of new works.

The announcement contained in our last number of the projected junction of two of the gas companies at present supplying gas in the city of London, must this month be followed by that of the failure of all negotiations for carrying into effect so desirable an object; and the consequent relapse of both parties, for the present at least, into a state of open hostilities. The correspondence by means of which the negotiations between the parties have been carried on, has been placed in our hands; but, while there is the slightest prospect of an honourable peace being concluded, it would be premature in us to publish it; and we are not without some expectation that the difficulties under which one of them is well known to labour may yet produce an amicable solution of the contest. We may, however, without any danger of widening the differences between them, state that difficulties have arisen from the refusal of the shareholders of the Great Central Company and the committee of the gas consumers to ratify the provisional agreement come to between the directors of the two negotiating bodies, of which the following was the position when the several bodies summoned their respective constituents:—

"That the City Gas Company be amalgamated with the Great Central Gas Consumers' Company by act of Parliament, with all the clauses contained in the company's bill now pending in Parliament for the security of the public.

"Conditions of Amalgamation.

"1. That the power and capacity of the Great Central Gas Consumers' Company's works, machinery, and pipes, for the purpose of manufacturing, storing, and distributing of gas, be ascertained by competent gas engineers; and that the Great Central Gas Consumers' Company be allowed a proportion of the paid-up shares of the Amalgamated Company equal to the value of the site, and to the sum at which, in the judgment of such gas engineers, works, machinery, and pipes, may be now constructed and layed of sufficient capacity to manufacture, store, and distribute the same quantity of gas.

"2. That the City Gas Company be allowed a number of paid-up shares in the Amalgamated Company, equal to the value of their site, works, &c., to be estimated in the manner described in the last article. A deduction is to be made by such gas engineers in the valuation of both company's works and pipes for any defects of construction or deterioration from wear and tear.

"3. That the Great Central Gas Consumers' Company be also allowed in the shares of the Amalgamated Gas Company, by way of good will for their trade, the amount of the sums actually expended by them in preliminary expenses and otherwise in the formation of the company.

"4. That the City Gas Company be likewise allowed, in the shares of the Amalgamated Company, by way of good will for their trade, an amount upon their present gas consumption proportioned to the amount allowed to the Great Central Gas Consumers' Company as good will upon their present actual consumption.

"5. That the capital of the Amalgamated Company be fixed at 25,000 or 30,000 shares, of £10 each, amounting to £250,000 or £300,000, upon which the 10 per cent. dividends are to be paid; and that, if such amount should prove insufficient to supply floating capital and to meet the foregoing sums to be allowed to the two companies, the balance is to be paid to them in cash, to be raised under the borrowing powers of the companies' bill.

"6. Each company, before amalgamation, is to discharge its own debts out of its own funds; and is to have for its separate benefit all other assets not comprehended in the site, works, machinery, and pipes.

"7. It is to be left to the referees to determine the machinery by which the amalgamation is to be carried out; and, if any dispute arise as to the details, subject to the foregoing principles, it is to be left to the referees to decide such disputes."

At the subsequent meetings, statements were made as to the flourishing condition and prospects of the Great Central Company, which, if true, had better have been left alone; and, if untrue, cannot fail of being unmercifully exposed before a parliamentary committee. But, whether true or not, they have had the effect of creating a strong feeling against the policy of joining the fortunes of such a flourishing concern as theirs is

represented to be, to one so irrecoverably rotten as to pay with difficulty a 4 per cent. dividend on their capital with gas at 4s., while their own directors tell them, within six months of the commencement of their operations, that they can pay a 10 per cent. dividend out of gas at 3s. 6d. This feeling exhibited itself with such force as to cause the rejection of the proposition of the directors for an unconditional assent to the terms agreed, and the nomination of committees from each body, shareholders and gas consumers, to watch over the negotiations and modify the conditions of the proposed arbitration as they might see fit. The result has been a demand to modify the terms originally agreed upon, by excluding from the valuation, the good will of the trade of either concern, though the committees were willing to allow the Great Central Company their £25,000 of preliminary expenses. A proposal so obviously unjust has been promptly declined in the following terms, and there for the present the negotiations have terminated:—

"City of London Gas Light and Coke Company.
"Office, Dorset-street, 5th April, 1851.

"Gentlemen,—I am directed by the committee of management of the City of London Gas Light and Coke Company, with the concurrence of the joint committee of this company, to inform you that your communication of the 29th of March ult., under the hand of your chairman, has been duly considered, wherein you state—'If you desire to introduce the value of the good will as an element in the calculation, the directors of this company, both on account of the shareholders and the consumers, decline to be parties to any such arrangement.' Whereas in your communication of the 19th of March ult.,—and particularly the enclosure therein, No. 4, headed 'Conditions of Amalgamation,'—you propose, in items 3 and 4, the good will of each of the companies is to be allowed for in shares. As, therefore, you now decline to be parties to any such arrangement, and have departed from your own propositions, you have terminated the negotiation.

"I am instructed to call your attention to the above observation only, notwithstanding other objections might be raised to your letter.

"The committee adhere to the resolution contained in their letter dated the 24th of March ult., which, to prevent any misunderstanding, I am instructed to repeat as follows:—

"'That the arbitrators determine upon the evidence of competent engineers the value of each of the undertakings at the present time, without reference to their original costs or nominal capital; and the shareholders in the present companies respectively shall be entitled in the stock of the Amalgamated Company to an amount of capital equal to such respective estimates.

"'That it be left to the referees to be appointed to determine the machinery or mode by which the amalgamation is to be carried out; and if any dispute arise as to the details, subject to the foregoing principles, it is to be left to the referees to decide such disputes.'

"I am, gentlemen, your obedient servant,
"D. Benham, Secretary."

"To the Directors of the Great Central
Gas Consumers' Company."

Each party is now preparing for a third campaign in Parliament, and for another conflict in the streets, the only certain consequences of which must be a further sacrifice of capital, and an additional permanent burden upon the gas consumers of the city of London.

When the rumour of this amalgamation was first bruited, the movement seemed to us to be premature. The wounds of recent hostilities had scarcely healed, and sufficient time has not yet elapsed to test the theories in which one of the parties had embarked. The failure of the negotiation has, therefore, not surprised us. Another year will do much to soften asperities, and prepare the way for an honourable peace, towards which the withdrawal of the bill now before Parliament ought to be the first step. If obtained at all (the possibility of which, seeing the state of business in Parliament, is more than doubtful), it can only be by a great expenditure of money and ill will, both of which all right-minded men will deprecate; and, if again rejected, the weaker party must in the end submit to whatever conditions the stronger may dictate, or perish in the struggle. It is to be hoped, therefore, that a truce may be agreed upon, during the continuance of which some plan may be suggested, by which the object both parties profess themselves anxious to see accomplished may be brought about.

A project for the formation of a Marylebone Consumers' Gas Company has been brought forward during the last month under the auspices of the director of the Great Central Gas Consumers' Company, whose project for "*tickling*" gas up from Wales at a cost of 3d. per 1000 feet was so sarcastically laughed down by his co-director, Mr. Charles Pearson. Consumers of gas in that district would do well, before listening to the project, to ascertain whether the article with which they are at present supplied at 5s. per 1000 feet is not as cheap, in proportion to the light it affords, as that supplied in the city of London by the parent establishment would be if charged to them at 3s. per 1000 feet. It is well known that the Imperial Gas Company have, during the last year, used cannel coal in large proportions at a considerably increased expense, and that their gas has, in consequence, been superior in illuminating power to all other in the metropolis, except the cannel gas of the Chartered and Western Companies, for which 6s. is charged.

The Polytechnic Institution is now open for the reception of objects intended for the Exhibition of the Gasfitters' Association, and an interesting and numerous collection is anticipated. Among the many apparatus exhibited we trust there will be found some efficient and *cheap* governors for houses, shops, factories, &c. With every possible attention at the works, considerable variations of pressure are inevitable, and these are felt as great drawbacks in the better class of private lighting. Almost every house would purchase one at a low price as a remedy for this evil. The metropolitan gas companies have, generally, contributed liberally towards the expenses of this exhibition, but we are sorry we cannot say the same of the provincial ones. Many of them have at least not the excuse of the innocent writer of the following letter, to whose class of gas companies perhaps the success of the movement is of more vital importance than it is to many others:—

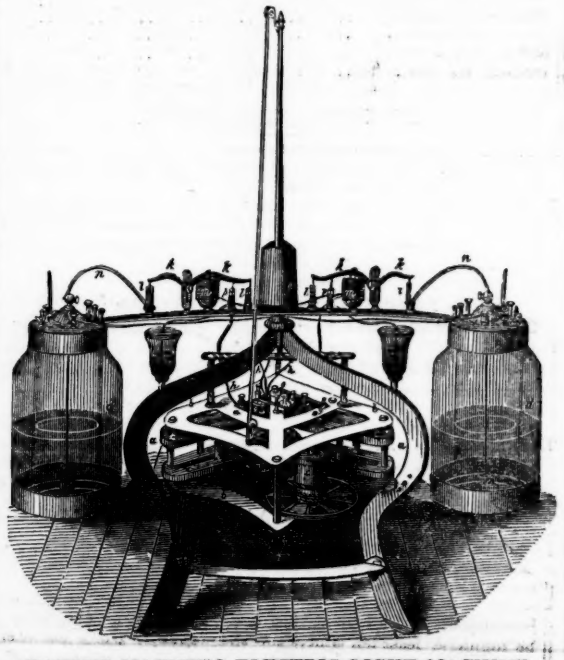
"———, March, 29, 1851.

"Sir,—In reply to the circular requesting subscriptions to the Gas Exhibition, 1851, I regret to inform you that the ——— Gas Company has never yet paid its expenses, and, therefore, their subscribing is, of course, out of the question; at the same time I beg to express their regret at not being able to assist in so desirable an object.

"I am, sir, your obedient servant,
"* * *."

Mr. Rutter's able article in our last, entitled "The Price of Gas," is about to be issued in a cheap form for general circulation amongst gas consumers and the public, whom it has become requisite to educate on all that concerns the trade in gas. No one is so happy in communicating knowledge on this subject as the talented author of this paper, and we cordially recommend it in its new form to the patronage of those in whose interest it is reissued.

Communicated Articles.



PAINE'S MAGNETO-ELECTRIC LIGHT MACHINE.

The machine here shown is double, both sides being alike. *a* is the frame on which the whole of the machine stands; *b b* is an inside frame for supporting the permanent magnets, *c c*; *d d* are the water-jars; *e* is a weight passing over a pulley, and terminating on the barrel, *f*, which is connected to the helices by means of gearing. The falling of the weight, *e*, causes the barrel, *f*, to turn, and with it the helices; *g g* are the discharging wheels, the edges of which are covered with some good non-conducting substance, with the exception of a point on their circumference, which is a good conductor. These discharging wheels are, by means of a spring, made to bear hard on the discharging rings, on the spindle of the helices; the conducting-wires, *h h*, are made to start from

the spring-arm, which is insulated. The advantage of this arrangement is that no discharge from the helices can take place until such time as the non-insulated point on the circumference of the discharging wheels comes in contact with the discharging-ring on the helix spindle, and, consequently, as the different diameters of the ring and wheel are proportionate, so will be the accumulation of the discharges; *i i* are the electrodes; *j j*, the vessels containing the turpentine. These should be constructed of some non-conducting substance, and the height of the column of hydro-carbon should be nearly equal to the height of the column of water round the gasometer, so that the hydrogen shall not pass through too rapidly, for by doing so the luminiferous or catalyzing process would not be thoroughly effected. To accomplish this purpose a mechanical means is adopted, to prevent, in some measure, the current of gas, and cause it to bubble up through the liquid, by attaching a cotton wick, or the hollow wick of an argand burner, to the end of the tube introduced into the turpentine, or again to perforate the end of this tube with small holes, through which the gas has to force its way, being subject in doing so to the friction due to so many holes. The gas in passing through these is divided into a number of small globules, thereby bringing a greater amount of surface in contact with the turpentine. The pipes which lead from the decomposing tank to the hydro-carbon should be made of non-conducting materials, or be coated with insulating substances, such, for instance, as sealing-wax, whereby great brilliancy of light is obtained. The hydrogen should, therefore, be conveyed through such pipes from the decomposing cells as soon as possible to the hydro-carbon, and afterwards collected in proper receptacles. These should be insulated, or composed of insulating materials. The pipes to conduct the gas to the point of consumption should also be composed of non-conducting materials, as well as the vessel for holding the turpentine, as before mentioned, for it is highly essential that the hydrogen should come in contact with the hydro-carbon, while this is in a highly electrified state. The governor before mentioned consists of a beam, *k*, working on a suitable centre; to this beam a platinum bar is connected, sliding in the insulated mercurial cylinder, *l*, which the conductors, *h h*, connect with the helices, and the electro-magnet, *m*. The other end of the beam is also connected in a similar manner to the mercurial cylinder, *l*^{1}, from which proceeds the conductor, *n n*, to the electrodes in the jar of water to be decomposed. Directly over the electro-magnet, *m*, is an armature, *o*. As the current is passed round the magnet, *m*, there will be a continued force acting on the armature, *o*, and to the beam on which it is attached. The action of this force may be regulated by a spring of sufficient force, bearing on the top of the beam, or by any other convenient means. The beam is so adjusted that the power of the spring balances the power of the magnet; and it may sometimes happen that the power of the latter is increased, the beam being drawn down; the platinum bar in the mercury is also drawn out, thereby destroying the connection, which remains broken until the power of the magnet decreases. The current being thus suddenly destroyed, a partial vacuum is formed, and the mercury flies out, and is thus lost. To prevent this occurrence an additional mercurial cylinder, *p*, is fixed, as shown, the beam having a platinum bar similar to the other cylinders. In this the mercury is so gauged that the bar shall enter the mercury before the other leaves it, thus turning the current into the cylinder, from which it is conveyed to the earth by a proper conductor.

SOME OBSERVATIONS AND EXPERIMENTS UPON THE COMPARATIVE VALUE OF COALS FOR THE MANUFACTURE OF GAS.

BY THOMAS G. BARLOW, C.E.

It is now an admitted fact that if, on the one hand, the invention of the gas meter has proved advantageous to the public in establishing an equitable system of charge for gas, it has, on the other, been often detrimental to their interests, by causing an unnatural pressure for the supply of a *low-priced* article, under the influence of which, materials of inferior quality have been resorted to, and the ingenuity of the manufacturer exercised in increasing the bulk of the gas produced from them, without due regard to its quality, or to its value as a light-giving material. That this has been the effect of the sale of gas by bulk, irrespective of any other standard, is apparent from the records of the Patent-office, where, for one patent taken out for improving the quality of the gas manufactured from any of the ordinary materials used for that purpose, there will be found at least ten others the sole object of which has been to augment the quantity of gas passed through the consumers' meters, without increase in the cost of its production. There are doubtless many important exceptions, especially in places where the merits of the question have been better understood by the public, and by the authorities, than they have been in others; but in the majority of instances low-priced gas has triumphed, wherever inferior materials can be readily procured; and, as its necessary consequence, a diminution of 30 per cent. in quality has generally followed a reduction of 20 per cent. in price. Such a system must have, and perhaps has already, reached its limit; as the public have begun to inquire "Whether *low-priced gas is cheap gas?*" and, should it be proved that *it is not*, then the inquiry will be followed by another, "*How is cheap gas best obtained?*" This is easily answered when the question is understood; and it is with the view of contributing to a correct appreciation of it in all its bearings, as much in the interest of gas companies as in that of the public, that these remarks are penned.

Till within the last few years "illuminating power" was a term almost unknown in reference to gas, except to the engineers and managers of the gas works of the large cities of the empire, and to a few scientific persons studying and taking an interest in questions connected with artificial light. The first legislative application of the knowledge that differences *did* exist in the light afforded by equal volumes of different descriptions of gas, appears in the Taunton Gas Act of 1845. In the Liverpool Gas Amalgamation Act of 1848, a quality clause was also introduced for the purpose of preventing any return to the use of gas of inferior quality extracted from common caking coal. In the following year the Great Central Gas Consumers' Company proposed the adoption of a quality clause, but with this difference, that the standard chosen was *lower* than that of the gas then, and for many preceding years, supplied over the greater portion of the metropolis; a fact which experience is now daily proving. That differences in the quality of gas do exist is, therefore, now matter of public notoriety; but of the extent of these differences, or their causes, less accurate knowledge is possessed even by those to whom such knowledge is of the highest importance.

The designing and construction of works is now but one, and indeed almost a secondary, department of the duty of a gas engineer: another and a more important one is that of the selection and proper treatment of such materials as produce the *greatest quantum of light at the lowest cost;* a duty requiring an absence of all prejudices in favour of one material in preference to another, and an intimate acquaintance with the nature, properties, products, and cost of each. But when it is stated that some of these materials yield gases which, bulk for bulk, have six times the illuminating value of others, it will be at once seen over how wide a range his inquiries must extend, and how often circumstances may arise to render a change advantageous. Who, two years ago, could have foreseen the possibility of Wigan cannel being brought by railway to London, and there competing with the sea-borne coals of Newcastle, which had hitherto been exclusively used in the manufacture of gas? or of Derbyshire coals being carried across the island from north-east to south-west, from Chesterfield to Cheltenham, and there driving the coals extracted from mines in the same county out of their natural markets? Yet these and many other apparently impossible operations are now successfully adopted in compliance with that call upon the ingenuity of the gas engineer, which compels the production of the greatest quantum of light at the least cost.

In most articles, and in coals more especially, where the transport from the place of their production to that of their consumption, constitutes the chief item of their cost, it is evident that it may be more economical to the consumer to pay a high price for a superior quality than a low price for an inferior one. The transport being the same, whatever may be the quality, must render the low-priced article more costly in distant markets than one of a higher price, but better suited to the purpose for which it is required.

It is much to be regretted that all examination of the value of the several qualities of coal susceptible of being used for the manufacture of gas should have been left to private and individual observation. More than two years since, when the metropolitan gas agitation was yet in its infancy, I drew the attention of the Government to the subject, and suggested the necessity of an inquiry similar to that which had taken place in reference to the coals best suited to the use of the steam navy. Such an inquiry would probably have silenced the clamour for low-priced gas, and ended in securing to the metropolis a supply of *good gas* at a fair remunerating price, instead of its present anomalous and transitory one, for no one can imagine that the low-priced party has permanently triumphed. The suggestion was, however, not acted upon; but the inquiry is of too important a nature to be allowed to drop; and each in his own sphere will be induced to carry it out, so far as he is able, with reference to those materials which come more particularly before him; and the present observations are given as the writer's first contribution to the more complete elucidation of such an investigation.

Before going into further detail it may, however, be necessary to state some particulars as to the relative value of the gas now supplied in the principal towns of the kingdom. Dr. Fyfe has already contributed much information on this head; but as many changes have taken place since his observations were made, and as they did not extend to the metropolis, some more recent information will not be out of place in such an inquiry as the present. The best mode of comparison with which I am acquainted is that in which the light given in combustion of gas is compared with that given by some other competing material used for producing artificial light. This is a test which speaks directly to the sense and understanding of all, and one which proves the immense economy resulting from the use of gas over all other materials employed for artificial light. I have found a spermaceti candle to be most equal in its quality for this comparison, and the following table indicates—first, the description of coal from which the gas is extracted in the several towns named; second, the value of each cubic foot of gas in grains of sperm; third, the equivalent of 5 cubic feet per hour in standard

candles of 120 grains; and fourth, the quantity of gas required to be consumed for giving the same light as 100 pounds of sperm candles:—

—	Coal used.	One cubic foot equal to grains of sperm.	Five cubic feet per hour equal to standard candles.	Cubic feet equal to 100 lbs. of sperm candles.
City of London* ..	Newcastle....	240 to 312	10 to 13	2916 to 2243
London (outside the City).....	Newcastle and cannel	336 to 360	14 to 15	2083 to 1944
London (West-end)	Cannel.....	600	25	1166
Bristol.....	Gloucestershire and Welsh coal and cannel	240 to 288	10 to 12	2916 to 2430
Birmingham	Staffordshire and Wigan cannel.....	288	12	2430
Leicester..... Nottingham..... Derby.....	Derbyshire...	336	14	2083
Leeds..... Sheffield.....	Yorkshire and cannel	432	18	1620
Liverpool..... Manchester	Wigan cannel	504 to 528	21 to 22	1388 to 1326
Glasgow..... Edinburgh.....	Mixed cannels	600 to 648	25 to 27	1166 to 1080

The cost of 100 lbs. of sperm candles being now £11. 13s. 4d., every inhabitant of the towns embraced in this list can easily calculate the enormous saving he effects by the introduction of gas but at the same time it cannot fail to be remarked that in proportion as the gas is low priced the saving is less, and that the really *cheap gas* is the *higher-priced* gas of Scotland, Lancashire, and Yorkshire, as it requires 2916 feet of some of the London gas at 4s. per 1000 feet, costing 11s. 8d., to give the same light as 1080 feet of Glasgow gas, which is charged 5s. per 1000 feet, and consequently costs only 5s. 5d. It is, therefore, quite evident that low-priced gas is not always cheap gas; and this leads me to the next branch of the inquiry, "How is cheap gas best obtained?" My reply is, "By the *gradual* substitution, where practicable, of gas equal to that of Manchester, in place of the low-priced gas now offered to the public in the eastern, southern, and western parts of England, the extra expense of production being added to the Manchester prices." I know the storm of prejudice and opposition which such a proposition will encounter, but I invite the most critical examination of its operation; and my firm conviction is that no other course will retrieve the damage gas property in the south of England has sustained during the last few years, and to which it is still further exposed if a stand is not now made against a system which tends to make the artificial light of the metropolis dearer than that of any other of the large cities of the empire.

But, while advocating a *gradual* increase in the illuminating power of gas instead of a reduction in price, it should only be carried into effect as the public become accustomed to the use of richer gas, and can appreciate it; nor should the standard be carried higher than that which can be permanently maintained. The great bulk of the gas manufactured in these kingdoms may be classed under three heads:—1st. The Scotch, of an average of 624 grains of sperm per cubic foot, obtained from mixtures of rich and poor cannels; 2nd. The Lancashire, of an average of 516 grains of sperm per cubic foot, obtained from Wigan cannel; and 3rd. The Newcastle, of an average of 288 grains of sperm per cubic foot, obtained from the common caking coal. The intermediate qualities are confined to small districts dependent on circumscribed coal-fields, and need not be further alluded to. The companies supplying cannel coal gas in a portion of the metropolis have adopted a standard higher than the Lancashire, and nearly approaching to the Scotch; but I fear they have under-estimated the cost of producing gas of this quality, and will find out that it would have been more prudent not to have exceeded, for the present at least, the Liverpool or Mancheter standard of 516 grains of sperm per cubic foot of gas. The great problem to be solved is, at what expense gas of this quality can, under the altered circumstances, be produced, as compared with the gas of inferior illuminating power now supplied in the southern and eastern counties of England.

In Scotland the system of mixing superior with inferior cannels in certain proportions, till the required quality of gas is obtained, has long been practised. The coal-field lying between and adjacent to the Clyde and the Frith of Forth is full of seams of cannels, giving gas varying in quality from 450 to 1275 grains of sperm per cubic foot. From these the Scotch gas engineer makes his selection according to the quality of the gas they yield, their residuary products, and their cost delivered at his works, so as to enable him to produce gas of the required standard quality at the lowest cost. In England the inquiry is necessarily more limited, and the English gas engineer either selects such material as will, without mixture, yield him the required results, or he adds to the materials best adapted to the production of common gas certain quantities of the richest material he can procure, at an equivalent cost, till the required quality is attained. Unlike the Scotch cannels, the differences between the various qualities of Newcastle caking coal suited for gas making, or between the several varieties of Wigan cannels, are so slight as scarcely to be worthy of notice in such an inquiry as the present. Some may produce a few feet more gas per ton than others, but, taking quantity and quality into account, I doubt whether the differences amount to 5 per cent.; whereas some of the Scotch cannels have four times the illuminating value of others, and hence, while the poor ones will not bear the expense of transport far from the place where extracted, the richer ones may compete in distant markets with low-priced materials for producing gas, and be advantageously employed for that purpose. This is more particularly exemplified in the poor Scotch cannels, which contain very little more illuminating matter than ordinary Newcastle coal, and, yielding residuary products of little value, would be dear even at equal prices; whereas the rich ones, with residuary products almost worthless, would be economical at even double or treble the price of Newcastle coal.

Having thus explained the principles of the policy which, in my opinion, ought to guide the gas consumer and the gas manufacturer, for the common benefit of both, I proceed to show how they may be carried into operation, by ascertaining, first, the relative value of the principal coals used in the production of gas; and of such mixtures of them, varying from 5 to 50 per cent., as may be beneficially employed for that purpose; and I propose thereby to aid the gas engineer in the selection of such as will enable him to manufacture gas of any required quality at a minimum expense in material.

In these inquiries the principle I have adopted is, first, to ascertain the quantity of gas produced from one ton of the various coals; then, the value of one cubic foot of the gas in grains of sperm candles; and, lastly, the value of the gas from one ton of the coals in pounds of sperm candles. Some writers have adopted specific gravity as the test of illuminating value, and others the condensation by chlorine; but neither is, in my opinion, so satisfactory as the Bunsen photometer. Specific gravity may afford some criterion of the illuminating value of gases made from the same materials, but none, when comparing the gas made from one species of coal with that made from another. I have found Boghead cannel gas, of the specific gravity of ·775, double in illuminating power to that from Wigan cannel of ·500; and though chlorine may indicate tolerably accurately the quantity of olefiant gas in any given compound, yet it does not denote the quantity of light carburetted hydrogen which forms the bulk of the illuminating matter in the gas extracted from inferior coals. The detonation by oxygen test is affected by the presence of carbonic oxide; and, in reality, no other test, except that by the photometer, can be satisfactory without a chemical analysis of the gases operated upon, an examination which few, except the experienced chemist, can satisfactorily perform.

The experiments herein narrated were conducted in an apparatus adapted to the distillation of the 1000th part of a ton of coal (2·24 lb., broken so as not to exceed a pigeon's egg in size), and the time occupied in the production of each cubic foot of gas was carefully noted, so that an accurate comparison of the same materials distilled under similar or different temperatures may be instituted by other experimentalists. I am aware that equal results can scarcely be expected upon the large scale as upon this small one, though I have satisfied myself they may be so within from three to five per cent.; but I believe that, for the sake of comparison, they are sufficiently near to practical workings to serve as data upon which to found calculations as to the *relative value* of the materials operated upon for producing artificial light.

Newcastle caking coal, being the material most extensively used in England by the gas manufacturer, first demands my attention. Its low price and unlimited supply, combined with the excellent quality of its coke, have given it a firm hold upon the English and foreign markets, from which it is not likely to be speedily dislodged. Indeed, when we reflect (as it will subsequently appear from these experiments) that it may be so treated in combination with richer materials as to yield a gas equal to that of Glasgow and Edinburgh *at but a slight increase in cost*, it would seem destined to be still the main source from whence the cities and towns of the west and south coast of England must draw their supplies of coal for the production of gas, should even the *good-gas* principle finally prevail over the *low-priced* system. The specimen selected for these experiments (Pelton Main) is a fair example of the general quality of the gas coals of the Northumberland and Durham fields, and of which nearly 380,000 tons were consumed by the metropolitan gas works during the past year.

Experiment No. 1.

Newcastle Caking Coal (Pelton Main).

Charge 2·24 lbs., at moderate heat.

* I am informed that the illuminating power of the gas supplied by one of the companies now lighting the city of London has been as low as 7 candles for the 5-feet burner, or 168 grains of sperm per cubic foot. Little else could be expected from common coal distilled at an excessive temperature in retorts 18 feet long, and from which the gas is taken off at one end only.

Time occupied in the distillation of each foot. Min. Sec.	One foot.	Total time occupied in the distillation of the successive feet. Min. Sec.	Successive feet.
2 44	1·		
3 4	1·	5 48	2·
3 32	1·	9 20	3·
3 45	1·	13 5	4·
4 0	1·	17 5	5·
4 29	1·	21 34	6·
4 48	1·	26 22	7·
4 50	1·	31 12	8·
4 52	1·	36 4	9·
4 36	1·	40 40	10·
1 0	·11	41 40	10·11

PRODUCTS.

10,110 feet of gas per ton,
1,540 lbs. of coke ,,
70 lbs. of tar ,,
130 lbs. of ammoniacal liquor.

Each cubic foot of the gas, when burnt in a small batswing burner, was equal to 232 grains of sperm; hence 10,110 × 232 ÷ 7000 gives the illuminating value of the gas from one ton of coal, when so consumed, as equal to 335 lbs. of sperm candles. The next experiment, however, shows this mode of combustion to be imperfect, and that a more advantageous result is obtained when this gas is burnt in an argand burner.

The standard jet gave a flame $2\frac{7}{10}$ in. long with 1 in. pressure.

EXPERIMENT No. 2.

NEWCASTLE CAKING COAL (PELTON MAIN).

Charge 2·24 lbs., at moderate heat.

Time occupied in the distillation of each foot. Min. Sec.	One foot.	Total time occupied in the distillation of the successive feet. Min. Sec.	Successive feet.
2 50	1·		
3 7	1·	5 57	2·
3 18	1·	9 15	3·
3 50	1·	13 5	4·
4 0	1·	17 5	5·
4 16	1·	21 21	6·
4 50	1·	26 11	7·
6 4	1·	32 15	8·
6 15	1·	38 30	9·
1 55	·5	40 25	9·5

PRODUCTS.

9,500 feet of gas per ton,
1,550 lbs. of coke ,,
110 lbs. of tar ,,
130 lbs. of ammoniacal liquor.

Each cubic foot of the gas, when burned in a small batswing burner, was equal to 208 grains of sperm; when burned in a large batswing, to 250 grains; and when burned in a common sixteen-hole argand, to 311 grains. The illuminating value of the gas from one ton of this coal will, therefore, vary in the following proportions according to the burner used:—

Small batswing.... 9500 × 208 ÷ 7000 = 282 lbs. of sperm.
Large do. .... 9500 × 250 ÷ 7000 = 339 ,,
16-hole argand.... 9500 × 311 ÷ 7000 = 422 ,,

EXPERIMENT No. 3.

NEWCASTLE CAKING COAL (PELTON MAIN).

Charge 2·24 lbs., at high heat.

Time occupied in the distillation of each foot. Min. Sec.	One foot.	Total time occupied in the distillation of the successive feet. Min. Sec.	Successive feet.
2 1	1·		
2 17	1·	4 18	2·
2 27	1·	5 45	3·
2 41	1·	8 26	4·
2 57	1·	12 23	5·
3 9	1·	15 32	6·
3 16	1·	18 48	7·
3 32	1·	22 20	8·
4 10	1·	26 30	9·
2 14	·5	28 44	9·5

When the experiment was stopped, the yield of gas was at the rate of ·22 feet per minute, of a quality utterly worthless for giving light.

PRODUCTS.

9,500 feet of gas per ton,
1,540 lbs. of coke ,,
90 lbs. of tar ,,
80 lbs. of ammoniacal liquor.

No trials were made of the specific gravity or illuminating power, this gas having been made for mixing with gas of superior quality, as recorded in experiment No. 20.

EXPERIMENT No. 4.

NEWCASTLE CAKING COAL (PELTON MAIN).

Charge 2·24 lbs., at a good heat.

Time occupied in the distillation of each foot. Min. Sec.	One foot.	Total time occupied in the distillation of the successive feet. Min. Sec.	Successive feet.
2 5	1·		
2 23	1·	4 28	2·
2 28	1·	6 56	3·
5 31	2·	12 27	5·
3 13	1·	15 40	6·
3 5	1·	19 5	7·
3 40	1·	23 24	8·
3 35	1·	27 20	9·
2 0	·5	29 20	9·5

When the experiment was stopped, the yield of gas was at the rate of ·28 feet per minute, but of a quality utterly worthless for giving light.

PRODUCTS.

9,500 feet of gas per ton,
1,540 lbs. of coke ,,
180 lbs. of tar ,,
110 lbs. of ammoniacal liquor.

No trials were made of the specific gravity and illuminating power, this gas having been made for mixing with gas of superior quality, as recorded in experiment No. 21.

From the above it will be seen that an argand burner is best adapted for the combustion of this gas, and that the value of the coal, as indicated by these experiments, is—

Cubic feet of gas per ton of coal.	One cubic foot of gas equal to grains of sperm.	Five cubic feet per hour equal to standard candles.	Value of the gas from one ton of coal in lbs. of sperm.
9500	311	12·8	422

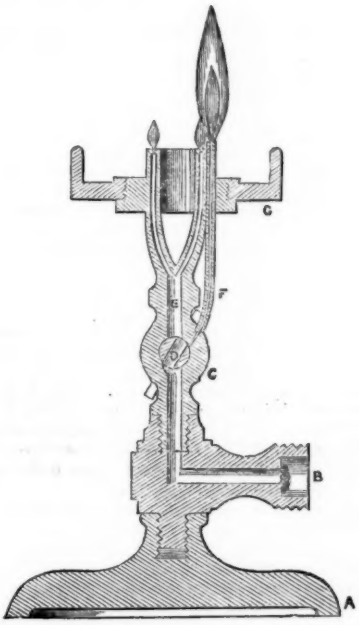
(To be continued.)

COMPOUND LABORATORY TESTING JET.

BY DR. HOFMANN,
Royal College of Chemistry, London.

The very extensive and daily increasing application of gas as a source of heat in chemical experiments has suggested to me a small contrivance which is intended to facilitate the operations of the analyst.

The ordinary Argand gas-burner which is almost universally employed for heating small vessels, such as flasks, retorts, and test-tubes, is not adapted to the purposes of the blowpipe. In operations with the latter instrument, a simple jet of gas is required issuing from a cylindrical orifice of rather considerable dimensions, the necessary amount of gas being adjusted by the stopcock. This simplest of all gas flames serves equally well for oxidation and reduction, and exhibits the phenomena of colour in the most perspicuous manner.



The ordinary method of analysis being a combination of testing in the moist way and by the blowpipe, it is necessary either to use two gas lamps—the one with the Argand burner, the other with the single jet—or to have a gas-stand so arranged as to admit of screwing on either the one or the other. But as it is inconvenient

to multiply the number of gas lamps, especially in a laboratory in which several analytical students are working, and as unscrewing hot gas jets is a most unpleasant operation, I have endeavoured to unite the two jets in one stand, dispensing at the same time with the necessity of taking the apparatus to pieces.

The object in view is accomplished simply by substituting for the ordinary stopcock a three-way cock.

The whole arrangement becomes at once intelligible by a glance at the woodcut, which represents the burner half-size.

A is the loaded foot, into which the elbow-union-piece B is screwed. One end of this union is connected with a flexible pipe, not shown in the drawing; to the other screws the three-way stopcock C. The plug D has only one orifice, and, when turned in a vertical direction, supplies the Argand burner through the perforation E. Into the side of the stopcock is soldered a small pipe F, having a bore of about $\frac{1}{8}$ of an inch. This is prolonged to the distance of $\frac{1}{10}$ of an inch above the top of the Argand burner, where it is brazed to a small support for the blowpipe, not represented in the drawing.

When the plug D is turned in an horizontal direction, the gas is shut off from both jets, but when turned in an inclined position may be made to supply both jets at once or either, alternately. By this contrivance either of the jets will be lighted before the other is extinguished.

In order that the jet may be likewise used for heating larger apparatus, there is a support G on which may be fixed a copper chimney, either plain or provided with the wire-gauze for producing the air-flame.

The above burner has been made under the superintendence of Mr. J. J. Griffin, whose assistance I thankfully acknowledge.—(*Quarterly Journal of the Chemical Society of London.*)

RECEIPTS AND EXPENDITURE OF THE BOROUGH OF SALFORD GAS COMMITTEE FOR THE YEAR ENDING JUNE 30, 1848.

RECEIPTS.

	£	s.	d.
Balance of cash on hand, June 30, 1847	32	18	1
Gas rents received	12,741	3	1
Gas rents outstanding, June 30, 1847	1,597	19	10
	14,339	2	11
Less gas rents outstanding June 30, 1848	1,691	14	2
	12,647	8	9
Coke, Gas Tar, Ammoniacal Liquor, &c., Sold.			
Coke	401	9	1
Gas tar	328	9	9½
Ammoniacal liquor	105	13	0
Cinders	2	12	6
	838	4	4½
Meters and Meter Boxes.			
Meters	533	2	0
Meter boxes	43	6	7
	576	8	7
Sundries.			
Unclaimed deposits (being balances over gas rents due)	8	17	5
Old iron (not retorts)	14	6	1½
Fines, summonses, informations, &c.	2	17	0
Old cistern, &c., sold	10	15	0
	36	15	6½
Balance of sums owing to and by the committee, June 30, 1848, say—			
Sums owing by the committee, as per balance-sheet	4,057	12	7
Sums owing to the committee, as per balance-sheet	3,150	3	11
	907	8	8
	15,039	4	0

EXPENDITURE.

Balance due to bankers, June 30, 1847					88	14	9
Balance of sums owing to and by the committee, as per report of 1847					421	18	2
Salaries.							
Manager	200	0	0				
Collector	150	0	0				
Office clerk	85	10	0				
Yard foreman (N.B. House, taxes, coal, and gas free)	78	5	0				
Inspector of meter and fittings	52	0	0				
Inspector of meters	52	0	0				
Ditto	31	0	0				
Lodgekeeper	52	0	0				
				700	15	0	
Workmen's Wages.							
Retort men	747	7	4				
Bricksetters	138	0	0				
Labourers at the works	305	19	5				
				1,191	6	9	
Interest, Chief Rent, &c.							
Property tax, one year	155	17	6				
Less received from Le Gendre Starkie	8	5	8				
Less received from the finance committee	54	16	6				
	63	2	2				
	92	15	4				
The finance committee, one year's interest on invested capital	1,879	17	9				
Bankers' commission and interest	4	19	10				
Chief rents, one year	284	1	8				
Less received from the Town-hall and Markets' committee	103	8	4				
	180	13	4				
The improvement committee, balance of accumulated profits, to June 30, 1847	4,782	12	0				
				6,940	18	3	
Cannel and Lime.							
Cannel	3,304	14	3				
Purifying expenses	106	2	4				
				3,410	16	7	
Meters and Meter Boxes.							
Meters	512	8	4				
Meter boxes	38	2	6				
				550	10	10	
Main Pipes, Excavating, &c.							
Iron main pipes, &c., in Salford	265	17	1				
ditto in Broughton	63	12	8				
				329	9	9	
Iron Work, Retorts, Smith's Work, &c.							
Iron retorts	813	18	4½				
Iron castings for works	34	2	8				
Implements	32	17	5				
				880	18	5½	
Cement, Repairs of Pipes, and Streets.							
Cement	18	13	9				
Repairs of Water Works Company's pipes	1	6	8				
Repairs of streets	59	2	0				
				79	2	5	
Miscellaneous Expenses.							
Firebricks and fireclay	185	19	5				
Steam-engine	12	0	8				
Oil, paint, and painting	13	10	1				
Repairs of buildings	98	13	8				
Casual expenses on the works	30	18	4				
Expenses on the house at the works	6	6	7				
Burners	2	16	4				
Models and patterns	1	5	6				
Office expenses, stationery, &c.	39	17	11½				
				391	8	6½	
Balance in the bankers' hands, June 30, 1848				7	18	10	
Balance of cash on hand, June 30, 1848				45	5	8	
				15,039	4	0	

SALFORD GAS COMMITTEE STOCK ACCOUNT, JUNE 30, 1848.

ENGAGEMENTS.

The finance committee, interest account	1,825	1	3	
Le Gendre Starkie, chief rent	137	18	0	
Debts on simple contract	2,094	13	4	
				4,057 12 7
Excess of assets				37,814 2 0
				41,871 14 7

PERMANENT ASSETS.

Gas works, as per last report				37,597	16	1
Deduct allowance for deterioration for the year	939	18	10			
Deduct old cistern, &c., sold	10	15	0			
				950	13	10
				36,647	2	3
Add outlay in the year ending June 30, 1848:—						
Iron main pipes in Salford	265	17	1			
Ditto in Broughton	63	12	8			
				329	9	9
				36,976	12	0

FLOATING ASSETS.

Gas rents outstanding, June 30, 1848	1,691	14	2	
Sundry debts owing to the committee	2,422	9	0	
Cannel on hand	18	0	0	
Meters on hand	72	6	0	
Iron main and service pipes on hand	329	18	9	
Sundry materials on hand	307	10	2	
Balance in the bank, June 30, 1848	7	18	10	
Balance of cash on hand, June 30, 1848	45	5	8	
				4,895 12 7
				41,871 14 7

PROVINCIAL NOTES.

SALFORD.

No information relative to gas lighting in the manufacturing metropolis of the empire would be complete without it embraced its sister borough of Salford, separated from Manchester by the Irwell, as Southwark is from London by the Thames. Annexed are the published accounts of the gas committee of Salford, extending over the same period as those of the Manchester committee, given in the February number. The following additional particulars will also be read with interest.

The total quantity of gas made in each of the three years was—

In 1848.....58,000,000 cubic feet.
„ 1849.....60,500,000 „
„ 1850.....70,700,000 „

The maximum daily make during the same period was—

In 1848.....300,000 cubic feet.
„ 1849.....320,000 „
„ 1850.....360,000 „

The minimum daily make was—

In 1848.....60,000 cubic feet.
„ 1849.....70,000 „
„ 1850.....90,000 „

The mains are about thirty miles in extent.

Since June 24, 1849, the charges for gas have been as follow:—

When the quarterly consumption is under 50,000 cubic feet..... 5s. 0d. per 1000 feet.
Ditto amounts to 50,000 and is under 200,000..... 4s. 9d. „
Ditto, ditto 200,000 and upwards 4s. 6d. „

Correspondence.

THE LATE MR. HODGETTS.

SIR,—I beg respectfully to correct a statement made in your last journal, which I see is extracted from the *Manchester*

RECEIPTS AND EXPENDITURE OF THE BOROUGH OF SALFORD GAS COMMITTEE FOR THE YEAR ENDING JUNE 30, 1849.

RECEIPTS.

Balance of cash on hand, June 30, 1848			45 5 8
Balance in the bankers' hands, June 30, 1848			7 18 10
Balance of interest account, June 30, 1849			4 18 7
Gas rents received	14,085 19 9		
Gas rents outstanding, June 30, 1848	1,691 14 2		
	15,777 13 11		
Less gas rents outstanding, June 30, 1849	1,928 6 0		
		13,849 7 11	
Coke, Gas Tar, Ammoniacal Liquor, &c., Sold.			
Coke	477 9 6		
Gas tar	364 14 0		
Ammoniacal liquor	109 18 2		
Cinders	0 5 6		
		952 7 2	
Meters and Meter Boxes.			
Meters	461 0 9		
Meter boxes	40 3 0		
		501 3 9	
Sundries.			
Unclaimed deposits (being balances over gas rents due)	0 9 9		
Old iron (not retorts)	34 18 0		
		35 7 9	
Balance of sums owing to and by the committee, June 30, 1849, say—			
Sums owing by the committee, as per balance-sheet	1,708 16 2		
Sums owing to the committee, as per balance-sheet	1,376 8 9½		
		332 7 4½	
		15,728 17 0½	

EXPENDITURE.

Balance of sums owing to and by the committee, as per report of 1848			907 8 8
Salaries.			
Manager	200 0 0		
Collector	150 0 0		
Office clerk	43 15 0		
ditto, seven months	46 18 4		
Yard foreman (N.B. House, coal, gas, and taxes free)	79 15 0		
Inspector of meters and fittings	57 15 4		
Inspector of meters, thirty-two weeks	32 0 0		
Ditto	37 2 0		
Ditto five months	8 0 0		
Lodgekeeper	53 0 0		
		708 5 8	
Workmen's Wages.			
Gas men	775 14 7		
Bricksetters	173 1 9		
Labourers at the works	268 13 11		
		1,217 10 3	
Interest, Chief Rent, &c.			
Property tax, one year	167 19 1		
Less received from Le Gendre Starkie	8 5 8		
Less received from the finance committee	53 18 7		
	62 4 3		
	105 14 10		
The finance committee, one year's interest on invested capital	1,848 16 7		
Chief rents, one year	284 1 8		
Less received from the Town-hall and Markets' committee	103 8 4		
	180 13 4		
The improvement committee, proportion of profit to June 30, 1848	1,939 0 0		
		4,074 4 9	
Cannel and Lime.			
Cannel	3,819 0 3		
Purifying expenses	109 14 9		
		3,928 15 0	
Meters and Meter Boxes.			
Meters	432 19 6		
Meter boxes	34 8 9		
		467 8 3	
Main Pipes, Excavating, &c.			
Iron main and service pipes		659 18 9	
Iron Work, Retorts, Smith's Work, &c.			
Iron retorts	470 16 5		
Iron castings for works	173 16 11		
Implements	35 4 7		
		679 17 11	
Cement, Repairs of Pipes and Streets.			
Cement	22 3 0		
Repairs of Water Works Company's pipes	0 5 10		
Repairs of streets	86 5 9		
		108 14 7	
Miscellaneous Expenses.			
New shed at the works	60 0 0		
Firebricks and fireclay	260 17 4		
Steam-engine	0 9 0		
Oil, paint, and painting	21 15 0		
Repairs of buildings	32 10 0		
Casual expenses on the works	61 6 10		
Expenses on the house at the works	9 15 0		
Burners	3 11 3		
Models and patterns	0 15 6		
Office expenses, stationery, &c.	37 12 7½		
		488 12 6½	
Balance in the bankers' hands, June 30, 1849		2,447 14 9	
Balance of cash on hand, June, 30 1849		40 5 11	
		15,728 17 0½	

SALFORD GAS COMMITTEE STOCK ACCOUNT, JUNE 30, 1849.

ENGAGEMENTS.

Sundry debts owing on simple contract	1,708 16 2
Excess of assets	40,856 1 9
	42,564 17 11

PERMANENT ASSETS.

Gas works, as per last report	36,976 12 0	
Deduct allowance for deterioration for the year	924 8 3½	
		36,052 3 8½
Add outlay in the year ending June 30, 1849:—		
Iron main pipes, &c.	659 18 9	
New shed at the works	60 0 0	
	719 18 9	
		36,772 2 5½

FLOATING ASSETS.

Gas rents outstanding, June 30, 1849	1,928 6 0	
Sundry debts owing to the committee	650 16 3½	
Cannel on hand	12 0 0	
Meters on hand	57 11 0	
Iron main and service pipes on hand	240 12 6	
Old iron (not retorts) on hand	33 0 0	
Sundry materials on hand	382 9 0	
Balance in the bank, June 30, 1849	2,447 14 9	
Balance of cash on hand, June 30, 1849	40 5 11	
		5,792 15 5½
		42,564 17 11

Guardian newspaper, and has reference to the lamentable death of Mr. Joseph Wainwright Hodgetts, which states that "many years ago he was the manager of the Salford Gas Works, and, subsequently, established some chemical works in the neighbourhood of Manchester."

He was a manufacturing chemist in Salford, and was elected a commissioner of police by his townsmen in the year 1833, and was appointed a member of the gas committee, and by that committee chosen as the deputy chairman of that board, which office he held until the year 1838, at the same time conducting his own business, until he left Salford for Devonshire; consequently he never was the manager of the Salford Gas Works.

I shall feel much obliged by the insertion of this in your next journal. JAMES STELFOX, Engineer and Manager.

Gas Works, Salford, March 25, 1851.

GAS COOKING STOVES.

SIR,—In the *Expositor* of last week I saw a portrait of Mr. Sharp, the manager of the Southampton Gas Works, and an article claiming for him the *invention* of cooking by gas. Now, I do not believe any man living can claim it as his invention. In 1739 Dr. Clayton boiled eggs by a gas flame; in 1792 Mr. Murdock frequently cooked chops and steaks over gas jets; and, in 1824, I perfectly well remember the men at the Ætna Iron Works, near Liverpool, making a gas cooking apparatus, which consisted of a gun-barrel turned backwards and forwards, and pierced with numerous small holes. When anything had to be fried the gridiron was kept in a horizontal position; when anything had to be roasted it was turned in a vertical position, and a plate of tin was placed behind the meat, as a reflector, or hastener, as I think the cooks call it. Mr. Sharp may have contrived a stove for cooking by gas; that is, pieces of iron so placed as to hold different things—some, perhaps, requiring to be boiled, others to be fried or roasted; but *I* believe that Mr. Alfred King, of Liverpool, arranged (I won't call it invented, for it is not worth the name, and I am sure Mr. King will not quarrel with the word) the first convenient apparatus for cooking by gas. Gas cooking stoves are not yet perfect; but they are already economical, and I hope will very soon be universal.

Putney, March 2, 1851. SAMUEL CLEGG, Jun.

RECEIPTS AND EXPENDITUEE OF THE BOROUGH OF SALFORD GAS COMMITTEE FOR THE YEAR ENDING JUNE 30, 1850.

RECEIPTS.

Balance of cash on hand, June 30, 1849			40 5 11
Balance in the bankers' hands, June 30, 1849			2,447 14 9
Balance of interest account to June 30, 1850			3 18 6
Gas rents received	14,479 14 9½		
Gas rents outstanding, June 30, 1849	1,928 6 0		
	16,408 0 9½		
Less gas rents outstanding, June 30, 1850	2,063 18 2		
		14,344 2 7½	
Coke, Gas Tar, Ammoniacal Liquor, &c., Sold.			
Coke	585 0 9		
Gas tar	417 2 11½		
Ammoniacal liquor	154 3 4		
Cinders	0 2 6		
		1186 9 6½	
Meters and Meter Boxes.			
Meters	459 15 6		
Meter boxes	40 7 9		
		500 3 3	
Sundries.			
Unclaimed deposits	0 7 10		
Old iron	47 8 2½		
Fines, summonses, &c.	0 2 6		
		47 18 6½	
Balance of sums owing to and by the committee, June 30, 1850:—			
Sums owing by the committee, as per balance-sheet	2,048 4 11		
Sums owing to the committee, as per balance-sheet	1,941 0 7		
		107 4 4	
		18,677 17 5½	

EXPENDITURE.

Balance of sums owing to and by the committee, as per report of 1849			332 7 4½
Salaries.			
Manager	250 0 0		
Collector	152 16 10		
Office clerk	80 5 0		
Yard foreman, 46 weeks	69 5 0		
Inspector of meters and fittings	62 8 0		
Inspector of meters	46 16 0		
Assistant inspector of ditto	21 10 0		
Lodgekeeper	52 3 4		
		735 4 2	
Workmen's Wages.			
Gas men	889 15 0		
Bricklayers at retorts	140 11 4		
Labourers at the works	338 7 4		
		1368 13 8	
Interest, Chief Rents, &c.			
Property tax, one year	169 4 1		
Less received from Le Gendre Starkie	8 5 8		
	160 18 5		
The finance committee, one year's interest on the invested capital	1,838 12 1		
Less property tax	53 12 6		
	1,784 19 7		
Chief rents, one year	284 1 8		
Less received from the Town-hall, &c., committee	103 8 4		
	180 13 4		
The improvement committee, proportion of profits to June 30, 1849	2,490 0 0		
		4,616 11 4	
Cannel and Lime.			
Cannel	3,772 4 9		
Purifying expenses	128 10 0		
		3,900 14 9	
Meters and Meter Boxes.			
Meters	414 19 4		
Meter boxes	38 2 9		
		453 2 1	
Main Pipes, Excavating, &c.			
Iron main and service pipes		723 14 11½	
Iron Work, Retorts, Smith's Work, &c.			
Iron retorts	481 5 10		
Clay retorts	57 4 9		
Iron castings for works	48 2 4		
Implements	54 13 10		
		641 6 9	
Cement, Repairs of Pipes and Streets.			
Cement	31 4 1		
Repairs of Water Works Company's pipes	2 7 8		
Repairs of streets	106 3 4		
		139 15 1	
Miscellaneous Expenses.			
Firebricks and fireclay	193 6 8		
Steam-engine	1 17 6		
Oil, paint, and painting	22 4 4		
Repairs of buildings	43 11 0		
Expenses on manager's house	24 19 4		
Burners	0 8 5½		
Casual expenses on the works	91 7 9		
Office expenses, stationery, &c.	48 0 9		
		425 15 9½	
New washer, valves, &c.		462 13 0	
Plans of Salford, &c.		107 0 0	
Balance in the bankers' hands, June 30, 1850		4,705 12 0	
Balance of cash on hand, June 30, 1850		65 6 6	
		18,677 17 5½	

SALFORD GAS COMMITTEE STOCK ACCOUNT, JUNE 30, 1850.

ENGAGEMENTS.

Sundry debts owing on simple contract	2,048 4 11
Excess of assets	43,873 16 9
	45,923 1 8

PERMANENT ASSETS.

Gas works, as per last report		36,772 2 5½	
Deduct allowance for deterioration for the year		919 6 0	
		35,852 16 5½	
Add outlay in the year ending June 30, 1850:—			
Iron main pipes	723 14 11½		
New washer valves, &c.	462 13 0		
Plan of Salford, &c.	107 0 0		
		1,293 7 11½	
		37,146 4 5	

FLOATING ASSETS.

Gas rents outstanding, June 30, 1850	2,063 18 2	
Sundry debts owing to the committee	536 4 4	
Sundry materials on hand	1,404 16 3	
Balance in the bank, June 30, 1850	4,705 12 0	
Balance of cash on hand, June 30, 1850	65 6 6	
	8,775 17 3	
	45,922 1	

[ADVERTISEMENT.]

WHITE'S HYDRO-CARBON GAS, AND THE LATE FATAL ACCIDENT AT MANCHESTER.

SIR,—In your last month's "Circular to Gas Companies," when referring to the fatal accident at Mr. White's naphtha distillery, I much regret to find you have been so misinformed as to impute a large share of blame (by implication at least) to the proprietors of the works, for their unsafe and, as you assume, imperfect construction, and state your conviction that, on any repetition of such a calamity, a coroner's jury would be justified in giving a very different verdict to that of "Accidental death." You will be sorry for having made use of such expressions when I inform you that to our late deceased friend was entrusted the entire erection and arrangement of every part and portion of these works, a special minute being entered on the books of the company that no one should interfere with him in any way whatever, but that the sole responsibility should rest upon himself, his instructions being simply to leave nothing undone to make all thoroughly secure. His experience in all kinds of chemical works for a period of nearly thirty years, with his well-known talents as a practical chemist of acute observation and judgment, warranted our placing this unlimited confidence in his management, and of which, through his whole professional life, he had proved himself so deserving. It is presumed Mr. Hodgetts could not have rightly understood that the worm of the still had been completely choked up for the previous two hours before his arrival, while the man in charge had most imprudently kept up a strong fire under it, causing necessarily so fearful a pressure within, that the head, with its fastenings (near 15 cwt.), was partly severed from the body of the still, forcing out the cement, and allowing a partial escape of the dreadfully-compressed vapour, but no part of which either did, or could, ignite, as you suppose. Brought suddenly to the works on this fatal morning, and very buoyant with hope from the great and gratifying results he felt he had obtained on the previous two days, and with little time for reflection, he very imprudently got on the top of the furnace to watch the withdrawal of the water from the condensing-tub, in which the lead worm was placed, with the view of the heat by this means communicating to the worm, and by melting the paraffine contained in it, clearing the passage through, instead of which, as in a less exciting moment he would have been the first to foresee, the lead gave way, and the vast pressure from within the still threw its boiling contents in great volume all around, part of which, having got to the ashpit, caught fire and ignited the whole, terminating in the awful results so faithfully narrated in your own journal, and to which my feelings will not permit me further to allude. This plain but faithful statement, which you will find fully borne out, will at once satisfy you that no possible blame can attach to any of the proprietors of these works, and you will have pleasure in doing them an act of strict and impartial justice by giving this a place in your next number. They feel themselves entitled to claim this at your hands, whatever your impressions may be of the merits or demerits of the hydro-carbon gas.

Mr. White has had the entire apparatus at the distillery put into the most efficient condition, sparing no expense to ensure perfect safety to all concerned, and under an arrangement it is believed unequalled in the kingdom, for obtaining the best results from the residual products, of which you have heard so much from interested parties, and of which you may, by and by, hear and see more. So far we are thoroughly satisfied and believe we are not likely to be mistaken.

I regret to observe the use made of the experiments on COAL TAR at the Manchester Gas Works, the illuminating power from which, although so brilliant at the test-burner, being greatly lost by standing in the gasholder, most probably from the deposition of the naphtha it contained. This has been most unhandsomely stated, both publicly and privately, as proving a total failure of Mr. White's gas; whereas it was a mere experiment, limited to COAL TAR only, and which, *not then* being found to answer, was at once given up. Nothing can, therefore, be more unfair than to draw such a conclusion from such a source; the best refutation to which is the daily exhibition of the gas here on a scale of magnitude that defies deception, and carries conviction to every observer, friend or foe, that anything approaching to it, either in purity, brilliancy, or cheapness, as well as in the simplicity and ease of its management, has yet to be discovered. Among the great numbers of millowners and scientific gentlemen of the highest standing who have for weeks past been visiting the works at Messrs. Clarke's here, not even one has left the premises without the strongest expressions of approval; and such, I am certain, would be your own case had you the time to spare for a personal inspection. When you have I shall be most happy to show you the whole without reserve, confident of the result. I should also have the greatest possible pleasure in seeing my venerated and talented preceptor, Dr. Fyfe, as your companion. The first glance of the light would disarm him of all opposition, and none would be more ready to make the honourable confession that he was quite mistaken in the statement so publicly given, that the water was not only "nil" but worse than "nil," and only spoiled the gas by mere injurious dilution. I should like to see an attempt made to persuade any one of the host of millowners and others who have been to see it that the gas upon which they are gazing with such approving delight is *spoiled* by the water used in its manufacture; it would, at least, be amusing. While stating this, I am not at all surprised at the opposition, and even ridicule, that have been cast upon this system by those whose prejudices and education have so necessarily warped their judgment. It does seem to require new minds to fully work out so startling a deviation from the former practice, and men, too, who can bear rebuffs, and only be stimulated by opposition. I, therefore, don't blame you for having so strongly throughout expressed your prejudices; but I do blame some of your correspondents who knew better while they sung out so unsparingly their tone of reprobation; but let that pass—we can now afford it. The "hydro-carbon abortion," therefore, as you facetiously call it, has already passed its boyhood, and looks a blooming, hardy youth bursting from its teens, and on the eve of attaining its majority. JAMES MILLER.

Higher Broughton, Manchester, March 25, 1851.

TESTIMONIAL FROM THE DIRECTORS OF THE RUTHIN GAS COMPANY.

"Ruthin, North Wales, February, 1851.

"The town of Ruthin having now been lighted by Mr. White's patent gas above two months, we have great pleasure in bearing our united testimony to its decided superiority to any coal or cannel gas we have seen. Its brilliancy and purity are in striking contrast to that obtained from coal, and its manufacture is very simple. It is hailed as a boon by every family, and is undoubtedly a social and sanitary improvement of great importance. The cost being also much under that of coal gas makes the advantage more valuable. We feel it due to Mr. White to present him with this testimonial of our high appreciation of his valuable invention, and our best wishes for his continued success.

"(Signed) F. R. WEST, M.P., Chairman,
ROBERT ELLICE, Vice-Chairman,
C. H. CHAPMAN,
JOSEPH PEERS,
ROBERT LLOYD,
EDWARD JONES.

"Further testimonials may be seen and every information obtained by applying to the patentee, Mr. Stephen White, No. 51, King-street, Manchester."

Register of New Patents.

WILLIAM DICK, of Edinburgh, professor of veterinary medicine, Veterinary College, Edinburgh, "*for improvements in the manufacture of steel and gas.*" Enrolled February 22, 1851.

This patent is for the manufacture of steel and gas at one and the same time, by causing iron bars to undergo the process of cementation in retorts used for the making of gas; the retorts preferred being those of fireclay, as at present in use. The bars, which it is more advantageous to have of the height of the retort, are laid upon the bottom of the retort with a thin stratum of coke intervening, and the furnace charged in the usual way for the preparations of gas, the bars being turned when the operation of charging is repeated, and allowed to remain in until the process of cementation be completed, which is tested in the usual way, by withdrawing a bar, cooling it suddenly, and breaking it to discover if it contains any grit, the disappearance of which indicates that the process is completed.

The patentee does not claim the conversion of iron into steel by the action of carburetted hydrogen shut up with the iron in the same vessel, but claims—the manufacture of steel and gas at one and the same time.

JAMES RENNIE, of Falkirk, gentleman, "*for a certain improvement or improvements in the construction of gas retorts and furnaces, and in apparatus or machinery applicable to the same.*" Enrolled March 5, 1850.

The first of these improvements consists in an arrangement of apparatus by which the retort or retorts are connected with the furnace-door in such manner that the opening or closing, or motion of the latter on its hinges, shall cause the retort or retorts to make a partial revolution, thus bringing every part of the charge under the more immediate action of the fire, and, at the same time, equalizing the wear of the retorts.

The retorts are formed of clay, but terminate at the inner end in a short metal shaft, which is supported in a plummer-block capable of sliding up and down to admit of the retort being adjusted to its level, or, if desired, removed altogether from the furnace. The necks of the retorts are also formed of metal, and have their bearings in plates attached to the front of the setting. The vertical pipe leading to the hydraulic main is connected to the retort by a ball and socket-joint, and has also a second similar joint to admit of its being moved aside when charging the retort. On the lid are formed a ring of teeth, into which gears a paul on the end of a lever supported in a suitable framing, and connected by rods with the furnace-door, so that, when the latter is opened by raising the lever, the paul takes into the teeth on the lid of the retort and causes it to turn. When more than one retort is used, the teeth are made to gear into each other, so that the revolving motion may be simultaneous.

A second improvement consists in lining the interior of the furnace with ashes, or some other bad conducting substance.

Miscellaneous News.

AMALGAMATION OF THE GREAT CENTRAL AND THE CITY OF LONDON GAS COMPANIES.

MEETING OF THE GREAT CENTRAL GAS COMPANY.

A special general meeting of the shareholders of this company was held on Monday evening, the 17th of March, at the City of London Tavern, for the purpose of taking into consideration "the proposal of the City of London Gas Light and Coke Company to amalgamate with this company, and, if such proposal be agreed to, to assent to clauses being inserted in this (the Great Central) company's bill, now before Parliament, to facilitate the arrangements for carrying the bill into effect." Mr. T. DAKIN presided, and the secretary having read the advertisement convening the meeting,

The CHAIRMAN opened the proceedings by stating that they had carefully prepared a report for the meeting, which had been very justly designated by a gentleman in the room as a most important meeting. They had arrived at an important crisis in gas lighting. He would wish to put them fairly in possession of the state of matters,

and could firmly say that their success was most incontrovertible. He thought their success and the importance of the meeting were in some degree cause and effect, for it could not be unknown to their rivals, the other gas companies, that they were now in a position of the most flourishing success. They were supplying a very large portion of the city of London, and were doing it in a manner that gave most complete satisfaction. They would see by the report that the directors proposed a dividend of 10 per cent. for the half year ending in June next. The directors had approached the subject of an amalgamation with another company with due regard to the shareholders' interests. They had carefully considered the matter, and the report on the subject (which they had prepared) would be read to them; but he wished them to express their opinions fairly on the recommendations which it contained.

The report, a very voluminous document, was then read. The following is an abstract furnished to the reporters by the secretary:—The report recommended the adoption of the proposed amalgamation of the two companies, and that the arrangement should be made by three arbitrators, two of them to consist of good commercial men to be named by both companies, and the third to be a barrister to be named by the Lord Chief Justice. They also made it one of the conditions of acceding to the proposal that their parliamentary bill should be allowed to pass during this session, so as not to fetter the parties pending this arrangement. The report recapitulated the circumstances which led to the formation of the company in 1847, when the citizens of London began to agitate for gas. The City of London Company supplied almost all the southern and western district to the amount of 300 million cubic feet, and the Chartered Company supplied the northern division with 200 million cubic feet. The commissioners of sewers consumed one-tenth of this supply, and paid 3s. 3d. per 1000 cubic feet, while the inhabitants were charged 7s. The citizens thought the price ought to be reduced to 5s., and appealed to the corporation and commissioners of sewers. Mr. Pearson and Mr. Croll demonstrated that a supply could be given at 4s., and afterwards lowered to 3s. 6d. The old companies were unwilling to do this, and the city solicitor agreed that this company should take the field and be bound by act of Parliament to supply gas at those prices. The shareholders had taken the matter in hand more as consumers than as capitalists, and now calculated on obtaining a 10 per cent. dividend and a progressive reduction of prices. Their last report showed that they had got one-half the consumption of the City, and hoped before long to obtain the whole. Their capital was £150,000. The number of shareholders 700. They supplied 4500 customers, and to private customers alone 250 million cubic feet of gas, and their number of customers was increasing at the rate of 50 per week. They calculated that, with a capital of £250,000, they could supply 736 million cubic feet of gas, but at present their works were only capable of making 300 million. The engineer's report showed that a half-yearly dividend of 10 per cent. could be paid in June, and that in January next, in addition to this, 6d. per 1000 feet would be returned to the consumers. In their deed of settlement they had provided for raising £250,000 in 25,000 shares.

The *British*, the *Commercial*, and the *Chartered* Gas Companies, and parochial and official authorities, had withdrawn their opposition to the bill.

A long correspondence between the *Central Gas Company* and the *City Gas Company* was then read, the effect of which was, that the latter company agreed to the arbitration recommended in the report, but that the directors would be better satisfied if some terms or principles of amalgamation had been explicitly laid down. However, they recommended the shareholders to adopt the proposal.

The Chairman then stated that the whole matter had been placed before them in a very candid and straightforward manner. He hoped they would weigh the report well in their mind, and vote after due consideration.

Mr. Edmiston asked the chairman in what manner this amalgamation would affect the dividends? He considered they should have the profits of their own business unconnected with the old company.

The Chairman, in reply, stated the principle of the amalgamation to be that the property of each company would be assessed and valued by the tribunal which had been proposed, and the profits would be in proportion to the respective values of each company.

Mr. Pearson remarked that no private arrangement had been made for the purpose of influencing the decision of the meeting. Any gentleman present might ask any questions he thought proper for the purpose of eliciting facts. His friend the chairman and the directors, with that straightforward conduct which had always characterized their proceedings, had not spoken to any of the shareholders to induce them to ask any questions or propose any resolutions favourable to the report which had been laid before them. The directors, on the contrary, were anxious that the shareholders should express an unbiassed opinion respecting the report. The report recommended the adoption of the proposal. As he was an honorary director, and not an elected one, he was not an official party to the report; but he had no hesitation in saying that, personally, he approved of it. With the truth of the matter contained in it he was cognizant, and with the recommendation he agreed, for the reasons stated therein. The concluding page of that report stated that they recommended the adoption of that proposal to the shareholders, because they had confidence in the integrity and ability of the tribunal to which it stood referred. He (Mr. P.) agreed to that recommendation. If he had any great amount of property at stake in the concern he should not have the slightest hesitation in leaving the whole matter to be decided by that tribunal; but, although the amount of property he had in that (the Central Gas) company was comparatively small, he had that which, in his judgment, was in higher estimation than pecuniary property, and that was his name and reputation as connected with the company. While, therefore, he agreed to the recommendation of that report for the reason stated, he considered that every individual present, whether his stock was large or small, should have an opportunity of fairly expressing his opinions on the subject. He (Mr. P.) could not see how it was possible for two commercial referees and a legal referee—men of influence, men of high principle and character—he could not conceive it to be possible that they should deal dishonestly with the fortunes of those two companies, and not only with the fortunes of those two companies, but with the fortunes of the gas consumers in the City—the gas consumers who were now existing, and those who should be the inhabitants of this City when their heads should be laid low. He could not believe that such referees could arrive at any other conclusion than that which the chairman announced to the meeting. They most distinctly understood that there was no rule prescribed to govern the judgment of the referees. He hoped this subject would be discussed fully, truly, and fairly by the gentlemen engaged in it. He trusted that each one would exercise his own private judgment, in order that they might not hereafter say, "Charles Pearson has led us to this." Every gentleman might vote in any way he thought proper. He was ready to give any explanation in his power with regard to the company. When that should be done, every gentleman who should ask a question of him or any of the officers of that company should have plain and straightforward answers from them all, after which they might exercise their discretion and judgment as to the course they might adopt.

Mr. Webber regretted that he did not hear the report read, and also that definite terms had not been explicitly proposed. Although he had every confidence in the integrity of the gentlemen concerned in this affair, yet he would not delegate to any two of the honestest men in the City the power of acting for him without his knowledge of the circumstances of the case. If it were a trading firm that required a partner they would want to know something about their condition before they went into anything like a contract; and he trusted that they, as men of business, would come to some definite terms, and not let men go sprawling in the dark, and when the thing was half done come for the sanction of the shareholders. He considered the best way, with all courtesy, would be to refer back the communication to the directors, and let them put forth some definite propositions.

The Chairman said those proposals were laid before them for their consideration, and that they came from the City Gas Company. They wrote to them to put an end to the strife that was going on, and leave the determination to a barrister; and they (the Central) said it was their interest to do so. They stated, if it were commercial, they would leave it to the decision of two merchants and a barrister.

Mr. Webber felt himself in the position he was in before as to there being no proposition made to them; if they had they would know what to deal with; and until then he would not know what to do. He hoped they would not take false steps; because, if they did, much contention, he was certain, would arise; and he thought that their best way would be to refer back the communication with all courtesy and respect. This would be acting like men of business. He did not know whether they were going to take a bankrupt into partnership or not. He had himself a scheme, he thought, that would convert their pipes into something at a future time. Until they had something tangible to grasp at, he trusted they would not allow it to go to a reference. They should first endeavour to ascertain what their income and expenditure, respectively, were. He thanked the chairman and the gentlemen for their kind attention, and moved that it be referred back for due consideration.

Mr. Venables said they had caused no ruinous opposition at all; they had gone on as men of business, soliciting their friends from door to door, and asking them to serve us with a commodity which had a very large consumption, that they might bring the prices down lower than at the present time. They did not mention the price it was eventually to be placed at. They were going to give it to the public at 3s. 6d., and if they continued the opposition they would give it for 2s. They ought to look at this affair in a cautious manner. The very onset of the Central Company's starting would have crushed many competitors, but they rested boldly on principle and not upon dividend; they also stood together to carry out a magnanimous scheme. He could not for a moment consider that they had a right to precipitate themselves into the hands of their enemy. Their fellow-citizens were thankful that they had given them a good commodity. How many years was it before they had their act of Parliament? He could not see where this cause of fear was that many people were alarmed at. Could a man start a business and go on in fairer terms than they had done? Why should they like to amalgamate with those who were daily losing their customers?

Mr. Webber repeated his previous suggestion.

A Shareholder did not see the necessity of amalgamation.

Mr. Machin thought if the amalgamation took place on fair and honourable terms it would be wrong to refuse it. He differed with the gentleman who spoke last, as he (Mr. Machin) was in favour of an amalgamation on equitable terms. He was ready to propose a resolution which would be satisfactory to many of the consumers. He was opposed to all offers of amalgamation without understanding the principle on which the offer was based.

Mr. Snoswell said they told them that when they had paid 10 per cent. they would return to the consumers 6d. or 8d. in a thousand feet; and he would wish to know what would be the position of the consumers with regard to their dividend? It had been shown at various meetings that the City Gas Company were losing ground within the city of London. If they were losing ground they would not be able to pay the dividend. It was well known they boasted of a large capital, but they were losing ground, and also losing the value of their dividends. They had got a vaunted boast of £300,000; but every man would see that that lay as a dead-weight on the company; for a great portion of that £300,000 was not paid-up capital. They were receiving a dividend on an unpaid capital. As it was remarked by a gentleman in the room that if he were carrying on business, with inadequate means, he would advertise for a partner, and he should know what his connections, capital, stock, and trade were

before he would enter into partnership. No man would ever join another man in business without knowing his whereabouts; and if he were not able to maintain his position he would most assuredly refuse to join him. First of all, he would recommend them to get their act of Parliament; then they would be in a position to treat with a company; then they would have the immunities and privileges which they chose to offer to the public. Until then he (Mr. Snoswell) considered they were feeling in the dark. But, as to depend upon commercial gentlemen with regard to integrity, he really suspected every man. (Cheers.) He really suspected himself—(laughter);—and, when he suspected himself, he was sure he really suspected every one else. (Renewed laughter.)

Mr. Pearson said it was with companies as with individuals, that prosperity had its temptations and adversities. Those gentlemen had shown no want of the quality of confidence and courage. In the month of May last, when they were going to lay down their pipes, they wanted £70,000. They came back in a few days after, and announced that they would take their shares for a month; but now, he would say, they wanted to manifest the quality of moderation in the hour of success. They should recollect that a coward, if driven to the wall, might turn round, and effect mischief on those who pressed him there. Do not shut the door against a reasonable amalgamation; do not let them be intoxicated by their present success; and drive these men to an act of desperation—he meant by reducing the price to 2s. or 2s. 6d. They had many consumers who told them that they would rather purchase of their company for 5s. than of the other for 2s. He would not wish them, however, to provoke those interminable hostilities. Was it not enough that £35,000 had been spent during the last three years in these contests? and was not that enough to induce the shareholders who wished to preserve their property to form an amalgamation on fair and honourable terms? Although he might personally have confidence in the proposed referees, he did not want to join in any man's decision. He hoped feelings such as those expressed by one of the gentlemen would not prevail as a general expression of the shareholders of this company. Those opinions would be referred back to the directors under circumstances which would leave the door open for arranging with other companies. They had a most efficient committee—it was small, but composed of intelligent men of action—men of high trust and character in the neighbourhood in which they lived. When that amalgamation was proposed they immediately convened a meeting. They considered that those terms were too limited in the consideration of a matter as mighty as that. The next evening, in the same house, they would have a meeting of the gas consumers; and, if the consumers should participate and sympathize with them, let there be an expression of willingness to amalgamate, and not be wasting their property in frivolous litigation. To resist this amalgamation would be to renew the agitation and frustrate their efforts to be useful. There should be no peace unless the principles first proposed to them were adopted, and that was an honourable and lasting amalgamation. They, all of them, were pledged to support the directors, and see that no injury should be inflicted on the company. He would show them how their £300,000 capital stood. £160,000 were paid up. Gentlemen who had shares of £90 in the course of two or three years would find them worth £120. Since the year 1847 the shares rose from £100 to £150, without a single farthing being paid up in the interim. In the House of Commons in 1847, by an order moved by Mr. Hume, they had 2000 shares at £100 each. Afterwards they set to work to prepare deeds to show that that £100 share was manufactured into a £150 share. They made a similar return in 1850. And in 1850, with their £150 shares, they represented their capital as £300,000. He had no fear of the reference proposed, and therefore desired that that meeting would distinctly understand the spirit of that proposal. For the reasons he had stated he was sure that their capital was only £150,000; he was also sure that their works were worth only £150,000. He was sure that an amalgamation on those principles would be honourable and advantageous to both parties. It would prevent the expense of litigation; it would save inconvenience, and an expenditure of money that was wasted for the payment of lawyers and others. He would say, if the shareholders wanted their dividends secured, and the consumers wanted their gas good, they should agree on fair and amicable terms. If he (Mr. Pearson) could be made useful as an instrument to carry out an amalgamation on fair and honourable terms he was ready to be the servant of that meeting. These were sentiments which would stamp their imprimatur on that company. They had been said to have been reckless in the destruction of property. He could see no such feeling about the directors; they were only bringing it down to the natural dimensions of their capital; and he believed if any arrangements were to take place they would receive back their capital in the amalgamated company, because they had property to that amount. A favourite poet of his said,

> "'Tis but the twinkling of a star
> Between the man of peace and war."

There was an opportunity of peace; if they would be moderate, constant, and firm, they should have a safe and honourable peace on safe and equitable terms.

Mr. Venables said they came there for peace, but let them have their credentials of peace before they entered into an alliance. At the same time they had never been at war with them. He thought the first thing they ought to do would be to amalgamate with the other company, whether they were eventually to give the consumers of the city of London cheap gas. He would say the citizens of London had stuck to them, and they should look to them as well as themselves. The observations that he (Mr. Venables) made with regard to their friends was, that they would rather deal with them for 5s. than with any other company for 2s.

The Chairman thought they ought not to lose sight of the fundamental principle laid down in the report; that was, to give security to the consumer never to be charged more than 4s., nor would any company decide on giving more than 10 per cent. dividend. He considered that if the shareholders of that meeting had not full confidence in the tribunal proposed they were right to demur. If the Chief Justice of England were to appoint a man of vigorous mind and talents, a man he would consider in his opinion perfectly competent to value the property, and that they (the company) employed two mercantile men on the other side, matters would be fairly settled. The question they would have to ask would be simple, "What is the price of your work? what consumers have you to bring to the joint account?" That question would be asked by both parties. That was the view he (the chairman) had taken of the question. He had perfect confidence in the tribunal to which this question would be referred. The shareholders would have perfect confidence if it were carried out, and the consumers could not be overcharged as he would venture to say they had in times past.

A Shareholder considered that the shareholders present seemed to forget that to carry out the full intentions of that company to light all London with gas they should expend £150,000 more. They would not be able to light the city of London efficiently with a capital less than £250,000. If they had expended all they had raised, it would not matter whether they would take in a whole company at the value of £150,000, or whether they would take in £150,000 worth of shareholders. He wished to know how an amalgamation could benefit them, if the estimated capital of £300,000 should turn out to be only worth £100,000.

Mr. Larby considered, as there was no motion before the chair, the report of the directors should be adopted by that meeting. It had been stated that a capital of £250,000 would be required to supply the citizens of London with gas. If they would undertake to serve a larger number of consumers they must extend their capital considerably. He considered the best course that could be adopted for men who wanted to act fairly would be for the board of directors to employ efficient men to value the property. If, on the other hand, men were left to choose some one thing and some another, no satisfactory result could be arrived at. He thought they should be all satisfied with regard to the manner in which the business of that company had been carried on hitherto. He was himself perfectly satisfied, because he felt assured that they would act as they had hitherto done. He, then, with great pleasure, moved the adoption of the report.

Mr. Edmiston seconded the motion.

A Shareholder moved the following amendment, which, after some conversation, was carried unanimously:—

"That this meeting are favourable to an amalgamation of the City of London Gas Company with the Great Central Gas Consumers' Company, provided it can be effected upon equitable terms. This meeting are of opinion that the principles of any amalgamation that may be proposed should be clearly defined, and should be submitted to a meeting of shareholders for their consideration; it appearing to that meeting that the interests of the shareholders and the consumers, which the question of amalgamation involves, are much too important to be left to any body of referees, however honourable and able they may be."

The Chairman proposed that a committee should be appointed from the shareholders to assist the directors in carrying out their negotiations with the City of London Gas Company, in order to form an amalgamation.

The following gentlemen were then appointed to act as a committee:—Messrs. Machin, Harley, Haywood, Kirk, Edmiston, Venables, Webber, Smith, Badger, Walton, and Snoswell.

Votes of thanks were then passed to the Chairman, Mr. Charles Pearson, and Directors, for their respective services, and the meeting separated.

MEETING OF THE GAS CONSUMERS.

A meeting of gas consumers of the city of London was held on Tuesday evening, March 18, at seven o'clock, at the London Tavern, Bishopsgate-street, for the purpose of taking into consideration the propriety of an amalgamation of the City of London Gas Light and Coke Company with the Great Central Gas Consumers' Company, upon such terms and by such means as three independent referees might determine.

Mr. John Dillon, having been appointed chairman, said his observations would be brief. He would take no part as an advocate on any side of the question that would come before him. With regard to the circumstances which led to that meeting, they would remember that in the year 1849 a meeting was held in that room of consumers of gas in the city of London who were paying more for their gas than they considered they had a right to pay, and getting a worse quality of gas than they were entitled to have. On that occasion a committee was appointed to devise means to obtain cheaper and better gas for the citizens of London. Of that committee he was a member, and he could say that they acted with an energy and talent which he thought, in a commercial matter, had rarely been equalled. They had succeeded in establishing a company, and pledged themselves to act fairly and generously with the consumers of gas in London in particular and with the commissioners of sewers representing the public interest in London. At the time this agitation commenced the price of 1000 cubic feet was 6s., and they pledged themselves that the price should be reduced to 4s., and that, after the shareholders should be paid 10 per cent. for the capital advanced, the remainder would be applied for the reduction of gas to 3s. The other companies, as they might know, reduced their charge from 6s. to 4s. It was not his wish or object to refer to their conduct discourteously, but he would say that if they had made that reduction in an early stage of the business—if they had done it handsomely and at once—the new company would never have come into existence. (Hear, hear.) They were now dealing with three gas companies to supply the citizens of London, all at 4s. It was proposed by one of the companies that they should coalesce, or, to use the language of the day, amalgamate; and it was to consider the propriety of that amalgamation that they were then called together. He wished to call their attention as consumers to two facts; the first was, that they were bound, for their own interest, to take care that, in the arrangements made with any company, 4s.

would be the maximum price of gas. They would observe that the cost of the three establishments must come out of the pockets of the people.

Mr. DAKIN said the board of directors of the Great Central Gas Company had thought that the best mode of bringing all facts before them in a clear and concise way was by bringing up a report.

Alderman WIRE read the report, which was the same as that proposed the evening before. When the report was read, Mr. Wire stated the terms proposed as to the way in which the amalgamation should take place.

Mr. DAKIN said they would observe in the report that had been read to them the fundamental points to be observed in the negotiations which were going on, and the principles upon which the amalgamation should be carried out. These principles were, that there was to be a maximum price of 4s. per 1000 cubic feet of gas, and a minimum quality of gas; that there was to be a public audit; and that not more than 10 per cent. was to be paid to shareholders. In the report which Mr. Pearson had given to the commissioners of sewers he laid down, as the best working principle on which gas could be supplied, that one company only should be the suppliers of gas. The report had brought before them the principles on which they recommended an amalgamation, and he thought they would be found economical in point of management. If those arrangements were to be made, they should be made at once. They were then in such a condition and arrived at a period when it would be necessary for them to make arrangements for a larger extension of their works. He wished, therefore, that both parties would come together as soon as possible on fair and equitable terms. The shareholders seemed to think that the interest at stake was so large that they would not leave the decision to three persons to determine finally the future proceedings of the gas company. He held the contrary opinion, believing that the interest of all parties would be best consulted by leaving the matter to referees. He concluded by moving the adoption of the report.

Mr. JOHN W. HALL had great pleasure in seconding the motion. He was in favour of the union because the expense incurred in working two establishments might be avoided; and this would enable them to reduce the price to the consumers, to avoid all that bickering and unpleasantness of feeling arising from rivalry and competition, and also prevent the necessity of breaking up the streets so often. He was of opinion, however, that an affair so important should not be left to the determination of any three persons. Let the companies value their respective properties and then propose terms, and, if they could not agree, it would then be very easy for them to call in other parties to arbitrate their differences.

The report was then adopted.

Mr. PEARSON recommended the appointment of a committee of consumers to act with the directors. When these negotiations were entered into the directors were desirous of having some authorized organ of the consumers to communicate with.

Mr. HOLT then moved that a committee be appointed for that purpose.

The proposition having been seconded, it was carried unanimously; and a vote of thanks having been warmly accorded to the chairman, the meeting dispersed.

COMMISSIONERS OF SEWERS FOR THE CITY OF LONDON, APRIL 1.

A meeting of the above commission was this day held at the Guildhall, Mr. Deputy Peacock in the chair, at which the following motion, of which notice had been given by Mr. Deputy Harrison, was to be taken into consideration:—"To present a petition to this court from the Great Central Gas Consumers' Company, praying the approval of the court to an arrangement for the amalgamation of that company with the City of London Gas Light and Coke Company, by which arrangement the gas consumers will have secured to them by act of Parliament, and by both companies, all the advantages that the court have by deed now existing obtained from the Consumers' Company, and to submit a motion to the court thereon."

Deputy HARRISON said he really had to ask the indulgence of the court on a subject of which he had given notice at the last court, and which stood upon the paper for consideration that day: he meant with reference to the proposed amalgamation of the City of London Gas Light and Coke Company and the Great Central Gas Consumers' Company. (Hear.) Since that period he had received no communication from the Great Central Gas Consumers' Company, nor from that of the City of London. In consequence of this circumstance, he had called at the offices of the former as he went to that court that morning, and there he learned that the question of amalgamation between those two respectable bodies was satisfactorily progressing. When one of the directors of the Consumers' Company asked him, on the last occasion, to give notice of the petition praying the approval of the Court of Sewers to the proposed arrangement, he (Deputy Harrison) fully expected that before that day (Monday) the necessary deeds would have been exchanged by the companies. That, however, had not been the case, through some circumstances which, unless the court desired it, he should prefer not going into. He begged, therefore, that the whole matter might be permitted to stand over until a future time. (Hear.)

Mr. WATSON felt that it was desirable, under the circumstances, that an adjournment of the question should take place. On his proceeding to the court that morning he had met the chairman of the Consumers' Company, Mr. Dakin (one of the members of the Court of Common Council), who then informed him (Mr. Watson) that the arrangement was progressing very favourably. (Cheers.)

Deputy HARRISON then said, that perceiving many gentlemen present who had come undoubtedly for the purpose of supporting the motion of which he had given notice, and which, as he said before, he had honestly intended to submit to the court, and wishing to stand well with every member, he felt that it was due from him to state that the question should not again be brought forward without proper notice of the same was given upon the business paper, and sent to every member of that commission. (Hear, hear.) He must for the present, under the circumstances, withdraw the motion altogether, as it would not be convenient to have to apologize every time the court met for being obliged to postpone it.

One of the Aldermen (Finnis), our reporter understood, observed that the question to be decided was one of great importance, and could not, therefore, in a moment be disposed of.

Deputy HOLT believed that the negotiations were going on favourably, and that there was every possibility of the issue proving satisfactory to all parties.

The motion was then, by leave, withdrawn.

APRIL 8.

A meeting of the commission was held this day—Mr. Deputy PEACOCK in the chair. After the transaction of the usual routine business,

Mr. H. L. TAYLOR said he was somewhat disappointed at the last court to find that a motion, of which special notice had been given by Deputy Harrison respecting the gas question, did not come forward. He meant a petition from the Great Central Gas Consumers' Company, requesting the approval of the court to an amalgamation between that body and the City Gas Company. (Cries of "Order!")

The CHAIRMAN said that the calls for order were perfectly correct: there was no question before the court.

Mr. H. L. TAYLOR knew that so great was the anxiety of the chairman, and also of every gentleman connected with that court, for information upon the subject of the amalgamation of the two companies,—inasmuch as it was a matter which concerned them all—that he was quite sure that they would pardon him whilst in a few words he would endeavour to give them the——

Mr. BLAKE rose to order. Unless his friend Mr. Taylor had a motion to propose, which might be brought fairly before the court, it was not right that he (Mr. Taylor) should be permitted to make the office he held as a commissioner the medium of making statements either advantageous or detrimental to any public body. (Hear.) If Mr. Taylor wished to proceed he ought to give proper notice.

Mr. TAYLOR considered that in that court they had a right to proceed.

The CHAIRMAN inquired whether Mr. Taylor intended to give notice of motion.

Mr. TAYLOR was at a loss to know how it was that he was interrupted as he had been. How was it possible that any party could tell whether he (Mr. Taylor) intended to give notice of motion or not, before he was allowed to explain? He thought that it was exceedingly singular that in that court, upon the subject of the gas question, he never could rise without being subjected to opposition, however anxious he might be to furnish information of the greatest degree of interest to the commissioners and the public. ("Hear," and "No, no.") He knew that in the Court of Common Council there was a standing order which precluded any member of the court from drawing attention to any subject connected with the interests of the City, but in that court, the Court of Sewers, it was different.

Deputy SADLER rose to order. Mr. Taylor was the last person he would rise to interrupt, but he (Deputy Sadler) must do so. They had nothing to do with the subject to which Mr. Taylor had referred. (Hear.) It was not their business as commissioners to mix themselves up with the disputes of rival gas companies. All they had to do was to congratulate themselves and their fellow-citizens upon their having obtained cheap gas. ("Order!" and much confusion.)

Mr. ROBERTS considered the court was out of order altogether in permitting the conversation.

Mr. TAYLOR then said that he would submit a motion, which was to the following effect:—"That the document he held in his hand, which afforded all the information necessary for the public, be entered upon the minutes of the court." At their last meeting it was stated by a gentleman, who had previously given notice of his intention to submit a motion to the commission, that he (Deputy Harrison) was not then in a position to go into the matter, inasmuch as the necessary deeds were not completed. That statement he (Mr. Taylor) gathered from the reports of the proceedings in the morning journals, and he must say that he much regretted that he was not present at the time that statement was made, as he then was in possession of information with reference to the matter which he regarded as being of considerable importance to the public. (Hear.) He therefore took that opportunity of doing so. (No, no.)

Deputy STEVENS: Deputy Harrison is not now present. (Hear, hear.)

Mr. TAYLOR: And on the last occasion I was absent.

Deputy LOTT: That, therefore, restores the equilibrium. (Laughter.)

Mr. TAYLOR, in continuation, said that he had further to inform the court that the failure of the proposed arrangement between the two companies referred to was not owing to any fault on the part of the City Gas Company. ("Order," "Chair," and much confusion.) Surely they were not disinclined to hear the truth. (Order.) He hoped they were anxious that each company should bear only such blame as really belonged to it, and that one of them should not have the credit of benefiting the City, and escape all the blame. With regard to the amalgamation, he would say——

Mr. BLAKE again rose to order. The petition had been withdrawn. The matter could not be entertained.

Mr. TAYLOR: Are you, then, afraid to hear the truth? ("Hear," and "No, no.")

After some further conversation (during which Mr. Deputy Harrison entered the court, amidst the loud cheers of the members) the chairman protested against the discussion continuing any longer. Mr. Taylor might ask any question he pleased of the worthy deputy (Harrison), if he (Mr. Taylor) sought for any explanation.

Mr. TAYLOR would do so. Addressing Deputy Harrison, he then said that he regretted that he was not present upon the former occa-

sion, when he (Deputy Harrison) withdrew his motion as to the proposed amalgamation of the gas companies, as he would then have stated facts to the court of much importance to the consumers and the public. He (Mr. Taylor) then wished to ask the worthy deputy what was the state of the negotiation between the two companies at that time? He asked that question for this reason, that he had learned from the public journals of last week that the deputy had assigned as a reason for the withdrawal of his motion that the "necessary deeds had not been prepared." He thought they ought to have afforded to them all the information possible for the sake of the public, who were so largely interested in the question.

Mr. BROOKE protested against the deputy answering the question.

The CHAIRMAN ruled that Mr. Taylor was in order in proposing the question; the deputy might answer it if he pleased, or otherwise.

Deputy HARRISON replied that he apologized at the last court for withdrawing the motion of which he had given notice, and he gave them his reasons for such withdrawal. Since that period he had no communication from either the one company or the other; and, although he had heard that the negotiation was going on, still he was not prepared, officially, to make any further statement. Until then he would not trouble the court again on the subject.

Mr. TAYLOR then contended that, this being so, he was in a position to give the present state of the negotiations. Without making any speech, he would read from the paper he held in his hand all the facts of the case. If it were necessary he would go into all the circumstances, even though an hour was consumed in doing so.

Deputy STEVENS thought it was not right that such a statement should be read there.

Deputy LOTT thought that that question was for the court to decide. Mr. Taylor was quite right in bringing it forward.

Mr. BROOKE considered that they had nothing whatever to do with the private disputes of gas or any other companies. (Hear, hear.)

Deputy HARRISON and Mr. TAYLOR then entered warmly into a merely personal debate, which would be of no public interest if reported; after which

Mr. TAYLOR complained of the statements Deputy Harrison had made. He (Mr. Taylor) respected much many of the gentlemen connected with the new gas company, especially Mr. Dakin, the worthy chairman. ("Hear, hear," and cheers.) He (Mr. Taylor) would not have it said that he went there to make an attack upon them. He never thought of doing anything of the kind. (Hear.) His object was truth, and he desired to lay that truth before the court and the public. (Cheers.) Truthful information upon that subject, he contended, was, at the present moment, most valuable to the public at large.

Deputy HARRISON: We are very much obliged to you, Mr. Taylor, I am sure.

The conversation then dropped, and the court shortly afterwards adjourned.

ASSOCIATION OF GASFITTERS.

MR. KEATE'S LECTURE ON GAS IMPURITIES.

At the usual monthly meeting of the Gasfitters' Association, held on Tuesday evening last, Mr. Dethridge in the chair,

Mr. KEATES delivered an interesting address on the chemical nature of the impurities of gas. The lecturer said it was with some diffidence he attempted to address a meeting of truly practical men on a subject of this kind. There was a great difference between giving a popular lecture to a mixed audience supposed to know little about the subject and addressing a number of gentlemen all of whom were more practically acquainted with the subject than himself. He was supposed to know something of the chemistry of gas, though he knew but little of its manufacture. He would, therefore, confine his observations to the chemical nature of the impurities found in gas. In doing so he wished it to be understood that it was not his business to point out the impurities of the gas made in London or elsewhere, but to draw attention to the impurities found in gas generally with reference to their chemical character. He felt convinced that with respect to gasfitters, as well as other professions, it might be truly said, that the more knowledge they obtained of subjects collaterally connected with their profession, the better they would be qualified for carrying on the duties of the profession itself. It was impossible for the watchmaker, the worker in iron or brass, or the constructor of steam-engines, to effect any improvements in their respective departments without having a knowledge of many other things than those involved in their immediate occupation. It was so with gasfitters. By acquiring a knowledge of the chemical laws of gas they would be better able to carry on their business than if they remained in a state of ignorance on the subject. With respect to the importance of gas-lighting, it was scarcely necessary for him to waste their time by any observations. The importance of the subject was so generally recognised that it was no longer an extraordinary matter to meet with gas in private houses. The use of gas had become almost universal. In the north of England the practice of using gas in private dwelling-houses had become so common that gas fittings for lighting purposes were as usual as stoves for heating the apartments.

He would now call their attention, in the first place, to the source of gas. Of course coal was the great source of gas. Coal was derived from a spontaneous change in wood or vegetable matter. This change passed over a great period of time. Wood was composed of carbon, hydrogen, and oxygen, in the following proportions: —36 atoms of carbon, 22 of hydrogen, and 22 of oxygen. When wood was deprived of certain compounds, namely, 3 atoms of carburretted hydrogen gas, 3 of water, or hydrogen, and 9 of carbonic acid, it was then in the state of coal. The carburretted hydrogen gas was what was popularly known as the "firedamp," or explosive matter which caused so much loss of life in coal mines. Coal itself was composed of 24 atoms of carbon, 13 of hydrogen, and 1 of oxygen gas. This was the old analysis of coal, but it was not exact. By later analysis it was found that all coals contained nitrogen, and that nitrogenous products, such as ammonia and cyanogen, were derived from coal. The conversion of wood into coal was supposed to be by a process of oxidation, but the conversion of one kind of coal into another was not effected in that manner, but by an internal change in the elements of the coal itself, precisely similar to that taking place in alcohol when it underwent fermentation. Liebig, a famous German chemist, had noticed such changes in coal arising from the loss of the elements of olefiant gas in the proportion of four of carbon and four of hydrogen. The first of the impurities in coal to which he would direct attention was sulphuretted hydrogen, or, as the chemists called it, hydro-sulphuric acid. This was derived from the presence of sulphur in the coal; for coal contained not only this substance but certain other foreign matters, such as earthy compounds, oxide of iron, and iron pyrites, which were present as impurities. It was known by experience that, whenever hydrogen and sulphur were eliminated together, hydro-sulphuric acid was formed. If water were thrown on ignited coal which contained sulphur, the water would be decomposed, and a smell of sulphuretted hydrogen, closely resembling that of rotten eggs, would be detected, and the gas would pass off in the form of sulphuretted hydrogen gas. Another impurity was carbonic acid gas. He never heard a lecture on chemistry in which this had not been referred to. It was composed of one part carbon and two of oxygen. Carbonic acid gas was very injurious, because it was incombustible. If you added a little of this acid to carbonate of lime or soda, the carbonic acid gas would be given off rapidly with effervescence in a colourless form, and perfectly incombustible. It was, therefore, highly injurious. Carbonic acid possessed a great affinity for all the alkalis, and on that account it was extremely easy to remove it from coal gas. If you passed a stream of it into lime water or caustic potash, or soda, the carbonic acid would be absorbed, and a carbonate of lime would be formed. [The lecturer illustrated this by breathing into a solution of lime and water contained in a glass tube. The carbonic acid gas which he exhaled being absorbed by the lime was precipitated in a solid form as carbonate of lime or chalk.] In the same way if we wanted to remove this impurity from coal gas it would be only necessary to shake up such gas with lime water. The carbonic gas would then combine with the alkaline matter, and be completely abstracted from the coal gas, which would be then entirely purified. Carbonic acid gas was not an important impurity, because it was so easily removed. But the next impurity, carbonic oxide, was very different. It was completely inert. It possessed no affinities. It combined with no other substance. It passed through alkalis or acids. It was not absorbed. It was a combustible gas, and burned with a blue flame. Oxalic acid was composed of two parts carbon and three of oxygen, and was always combined with a certain quantity of water. It could not exist in a free state. It must be combined with water in order to maintain its character. Sulphuric acid, though not ordinarily without water, might be free from water, but this was never the case with oxalic acid. It would cease to be oxalic acid if the water were abstracted. No means had yet been discovered by which carbonic oxide could be separated from coal gas. Sulphuretted hydrogen was formed of the elements of the coal itself means of the hydrogen of the coal with the sulphur of the iron by pyrites. Sulphuretted hydrogen was easily detected both by its odour and its peculiar action on metallic substances.

The means usually employed to remove sulphuretted hydrogen was the lime purifier, but other means had lately been proposed upon which he was not prepared to express any opinion, but he had heard them spoken of with approbation by a man competent to judge.

Another of those impurities was ammonia. This was a powerful alkaline substance, one of the most powerful in the chemical laboratory. It was formed of one part nitrogen and three parts of hydrogen. It was invariably the result of animal decomposition. It was easily detected and easily removed, because it possessed such strong affinities for all acids that the moment you brought it into contact with an acid the ammonia was destroyed. [The lecturer illustrated this by showing that a paper stained with a tincture of turmeric when brought into contact with ammonia was changed to a dark brown colour, but when immersed in sulphuric acid the effects of the ammonia were at once removed.]

The affinity of ammonia for acids was so strong that when once brought into contact with an acid a saline compound was formed, which could not pass away with the gas, because it took a solid form. Cyanogen was the next impurity. This was the most remarkable substance in the whole range of chemistry—remarkable, not as a compound of nitrogen and carbon, but because its discovery had opened up such anamazing field to the organic chemist. It was discovered by Gay Lussac. It was composed of one part nitrogen and two of carbon. Cyanogen was a bicarbonate of nitrogen, and was capable of acting like chlorine, phosphorus, and other substances supposed to be elements. The discovery of cyanogen led to extended investigations into the nature of organic compounds. By means of this discovery, Professor Liebig was enabled to point out a number of compound radicals, capable not only of acting as acids, but as bases. By a base he (Mr. Keates) meant a substance, such as ammonia, capable of uniting with an acid. Ammonia, potash, lime, and all the metallic oxides were termed bases. The acids took the other side. Common salt was called by the chemists chloride of sodium. Cyanogen could unite with sodium, and, therefore, we had a compound called cyanide of sodium, or cyanide of potassium. Cyanogen was obtained by applying heat to some metallic cyanide, such as gold, platinum, &c. Cyanogen was the basis of prussic acid, the latter being a compound of hydrogen with cyanogen. In sulphuretted hydrogen we have a sulphuret or sulphide of hydrogen. In hydro-cyanic acid we had a cyanide

of hydrogen. In a glass tube which he held in his hand he had a bicyanide of mercury. By applying a heat to it the cyanogen would be given off freely at something below a red heat, and, when lighted, it would burn with a violet flame, which its Greek name signified. When the whole of the cyanic gas was burned off a black substance, called para-cyanogen, remained at the bottom of the retort. [This the lecturer demonstrated by an experiment, and he also used some experiments to prove that cyanogen was the base of hydro-cyanic acid.]

A common objection with respect to gas was, that it generated a great amount of heat. He was sure that there had been great exaggeration in this respect by persons not acquainted with the principles of gas-burning. It should be recollected that in gas light the burning principle was hydrogen, for when carbon and hydrogen were combined together the hydrogen burned first, and if there were only enough of oxygen to burn the hydrogen, the carbon would be left unburned, and a cloud of soot would be formed. The first thing that took place in gas-lighting was the combustion of the hydrogen, for if the carbon burned first there would be no light. The result of this burning, so far as the hydrogen was concerned, would be the formation of water, and, so far as the carbon was concerned, carbonic acid gas. If the carbon were burned first, there would be no light; for it was by being ignited or heated up to a certain point before it burned that carbon gave light. This might be illustrated by the common oxy-hydrogen light. When a bit of lime put into the flame came to a white heat, a considerable amount of light would be given off. The carbon in gas fulfilled the same office as the lime in the oxy-hydrogen light. But in the oxy-hydrogen light the lime is no source of heat; for the heat must be derived from the burning of the hydrogen, so that in such a light as that we have greater light *quoad* the quantity of heat than we have in coal gas. Comparisons had been made as to the quantity of air respectively consumed by a pound of oil and a pound of gas. Now, a pound of oil contained:—

Hydrogen ..	0·12
Carbon	0·78
Oxygen	0·10

and when burned produced little more than 1 lb. of water and about 3 lbs. of carbonic acid, and consumed about 13·27 feet of air. Now, 1 lb. of coal gas contained of hydrogen 0·3 and of carbon 0·7, and when burned produced of water 2·7 and 2·5 of carbonic acid gas, consuming 19·3 feet of atmospheric air. Whether a greater amount of heat was developed by gas than oil was an important question for the consideration of gasfitters. The public objected to burning gas in their apartments on account of the great amount of heat. It was strange, however, that such objections came from parties who, in a room where two mould candles were found to be sufficient, employed two fish-tail burners, and made those burners do their best. He had seen, in a room where one of Palmer's candles would have given sufficient light, three gas burners made to do their utmost. The complaints, then, should not be made of the gas, but of the parties who used it. These were circumstances which the gasfitter ought to consider, in order that he might be ready to remove errors of this kind from the public mind. Having briefly thanked the audience for their attention, Mr. Keates concluded amid loud cheers.

On the motion of Mr. Dethridge, a vote of thanks was given by acclamation to Mr. Keates for his excellent address.

Mr. Dethridge then informed the association that the donations to the exhibition of gas apparatus in operation, which at the former meeting were announced to amount to £500, had increased to about £700. A hood was being fixed at the Polytechnic to convey off the products from the cooking apparatus; and a photometer had been prepared by which the merits of every gasburner would be honestly tested. The committee were desirous of exhibiting every description of gas apparatus, from the most ingenious contrivance down to an instrument for heating a soldering iron.

The meeting then separated.

POPULAR LECTURES ON CHEMISTRY.

By H. Wyatt, Esq., B.A.

(*Continued from our last.*)

Olefiant gas, the second gaseous combination of carbon with hydrogen, may be prepared by heating one part, by weight, of alcohol, and five or six parts of concentrated sulphuric acid. The reaction is far too complex to be here explained. The gaseous products are olefiant gas and carbonic and sulphuric acids. The mixture of alcohol and sulphuric acid is placed in a roomy retort, as towards the end of the operation it is apt to swell considerably, and the gas is first passed through a flask containing water, and afterwards through a second flask containing a solution of potash, which absorbs the carbonic and sulphurous acids.

Olefiant gas is colourless, of a density of 0·9784; it burns in the air with a brilliant flame. It is partially decomposed when passed through a heated porcelain tube; solid carbon is then deposited on the sides of the tube. Olefiant gas burns in chlorine; in this combustion hydrochloric acid gas is formed, and carbon is deposited.

THE COMBINATION OF SULPHUR AND CARBON.

These bodies do not combine when mixed and heated under the ordinary pressure of the atmosphere; the sulphur distilling before the heat attains a height sufficient to effect the combination. But if we heat fragments of charcoal to redness, in a porcelain tube, and cause the sulphur to pass through the tube afterwards in a state of vapour, combustion of the charcoal takes place in the sulphur vapour, as in oxygen. When charcoal is burned in oxygen, it changes into carbonic acid; when it burns in sulphur vapour, it changes into sulphuret of carbon, or sulpho-carbonic acid. But in combustion in oxygen it is necessary to have the gas in excess, otherwise the oxide of carbon will be formed. Nothing of this kind is to be apprehended in the combustion of charcoal in sulphur vapour: sulphuret of carbon, and no other compound, is always formed, and less sulphuretted combinations have not yet been effected.

To prepare sulphuret of carbon, we fill a wide cast-iron tube with small fragments of charcoal, and place it in an inclined position, across a reverberatory furnace. The length of the tube being greater than the diameter of the furnace, its two ends will project over the sides of the latter. The lower end of the tube is connected with Liebig's condensing apparatus, the wide glass tube of which is kept cool by iced water, and terminates in a glass bottle with two necks, also placed in ice-cold water. A tube in the second tubulature of the bottle allows the escape of gaseous matter. The part of the tube containing charcoal being now raised to a red heat, a fragment of sulphur is introduced into the upper end, which is instantly closed. The sulphur melts, boils, and passes in vapour over the red-hot charcoal, which continues with it forming bisulphuret of carbon, which condenses in the bottle as a volatile liquid. A second fragment of sulphur is introduced very soon after the first, and, if the proportion of sulphur introduced at once and the heat of the charcoal be happily adjusted, a large quantity of the new compound may soon be obtained.

The gases disengaged appear to be a gaseous sulphuret of carbon, chiefly formed when there is too little sulphur, and sulphuretted hydrogen, arising from the presence of hydrogen or water in the charcoal.

Sulphuret of carbon is purified by distillation, at a very gentle heat, and then forms a very transparent, mobile, colourless liquid, of sp. gr. 1·272. It is exceedingly volatile, boiling at 108 degrees, and very combustible, burning with a pale blue flame, and producing sulphurous and carbonic acids. It is insoluble in water, but soluble in alcohol, ether, and oils. It dissolves sulphur and phosphorus readily; and these solutions, spontaneously evaporating, yield fine crystals of those elements. It also dissolves camphor, essential oils, and resins. It is used in the preparation of varnishes, which, from its great volatility, dry very rapidly.

CYANOGEN.

Carbon and nitrogen form one very important combination—cyanogen, the complete study of which will be better placed among the products of the animal kindom; but the combinations of cyanogen with metals present a complete analogy with the corresponding chlorides, and are frequently employed as reagents to characterize the metallic solutions, and distinguish them from one another. This consideration determines us to speak in this place of the principal properties of this body, as well as of the combination it forms with hydrogen.

Carbon and nitrogen do not combine directly, but if we heat a mixture of charcoal and carbonate of potash together in a tube, and drive a current of nitrogen through the tube, an oxide of carbon will be disengaged; and, if we afterwards heat the residue with water, we shall dissolve a notable portion of the cyanide of potassium which is formed.

Cyanide of potassium is prepared on a large scale in the arts, by heating a mixture of carbonate of potash with the incinerated residues obtained by calcining in an incomplete manner various animal matters, such as flesh, bone, horn, &c., in iron retorts. We shall describe the process more at length, when specially treating of cyanide of potassium.

If we pour a hot solution of nitrate of mercury into a concentrated and hot solution of cyanide of potassium, and leave the mixture to cool, a crystallized cyanide of mercury will separate, which may be purified by a new crystallization. By means of this cyanide of mercury we easily prepare cyanogen and hydrocyanic acid.

To prepare cyanogen we heat the cyanide of mercury in a small flask, or in a tube closed at one extremity, and furnished with an abducting-tube, which conducts the gas to a receiver placed over the pneumatic-trough. The cyanide of mercury decomposes into cyanogen, which is set free, and metallic mercury, which condenses, in the form of small globules in the retort. On heating the mixture until disengagement ceases, it is found that the substance does not wholly disappear in the reaction we have just described; a brown substance still remains, which presents exactly the same composition as cyanogen, and to which has been given, for this reason, the name of para-cyanogen. The portion of cyanogen which passes into this isomeric state varies according to the manner in which the cyanide of mercury is heated; but no one has yet succeeded in so conducting the operation as entirely to avoid its formation.

Cyanogen is a colourless gas, of strong peculiar odour. Its density is 1·86. Cyanogen gas liquefies when compressed, at the ordinary temperature, by a pressure of four to five atmospheres. Liquid cyanogen is a colourless, volatile fluid, with a density of 0·9. Cyanogen burns with a characteristic, purple-coloured flame; carbonic acid is formed by the combustion, and nitrogen is set free. Water dissolves from four to five times its volume of cyanogen gas, but it readily gives off the gas when its temperature is slightly elevated. The aqueous solution of cyanogen, left to itself in a stoppered flask, soon becomes of a brown colour, and in time deposits a brown powder. The decomposition which cyanogen undergoes in this case is too complex to be explained at present; nor has it yet been sufficiently studied.

Cyanogen and hydrogen do not combine directly. We obtain hydrocyanic acid by decomposing the metallic cyanides by hydrochloric acid. We may prepare hydrocyanic acid in the anhydrous state, or in an aqueous solution.

To obtain the anhydrous acid we decompose the cyanide of mercury with concentrated hydrochloric acid in a small flask. This flask is placed in connection with a tube, the first half of which is filled with fragments of marble, and the second with morsels of chloride of calcium. To the other end of the tube a U tube is adjusted, surrounded by a refrigerating mixture. The hydrocholric acid decomposes the cyanide of mercury, gaseous hydrocyanic acid is given off, and leads with it hydrochloric acid and watery vapour. The mixture passes into the tube containing the marble and chloride of calcium;

the hydrochloric acid, which is a powerful agent, decomposes the marble: chloride of calcium, water, and free carbonic acid are formed. Hydrocyanic acid,—a feeble acid,—does not react on the carbonate of lime. We have then a mixture of hydrocyanic gas, carbonic acid, and water, which penetrates the second half of the tube; only the aqueous vapour is absorbed, and the mixture of hydrocyanic and carbonic gas passes into the cool tube. Hydrocyanic acid condenses in the liquid state, while the carbonic acid preserves its gaseous form; but the hydrocyanic acid necessarily contains all the carbonic acid which it can absorb under the circumstances of its condensation.

Another process for the preparation of this acid is the following:—Fifteen parts of powdered ferrocyanide of potassium are to be distilled at a gentle heat, with a mixture of nine parts of oil of vitriol and nine of water, and the product is to be received in a convenient receiver, placed in a freezing mixture, containing five parts of chloride of calcium in small lumps. As soon as liquid enough has distilled to cover the chloride the distillation is stopped, and the hydrocyanic acid, deprived of its water by the chloride of calcium, is to be decanted into a dry and well-stoppered bottle. It may also be obtained by distilling, under similar circumstances, cyanide of potassium with dilute sulphuric acid. In both cases the acid is formed by the reaction of sulphuric acid on cyanide of potassium, or its elements, $K Cy + H, SO^4 = K, SO^4 + H Cy$.

Anhydrous hydrocyanic acid is a limpid and colourless liquid, of specific gravity 0·6967 at 66 deg.; at 59 deg. it becomes a fibrous mass, in consequence of the presence of a trace of water, and at 80 deg. it boils. The density of its vapour is 0·9476. It is inflammable, and has a very peculiar taste and smell. It is the most energetic poison known, one drop introduced into the mouth being sufficient to destroy an animal of considerable size. When pure it is soon spontaneously decomposed, depositing a dark brown solid; a trace of sulphuric acid causes it to keep perfectly. When in contact with the strong mineral acids and water it is decomposed, being converted into ammonia and formic acid.

LORD BROUGHAM'S PATENT LAW AMENDMENT BILL.

(From the *Patent Journal*.)

We have just received a copy of this important bill, an abstract of which we subjoin:—

Whereas it is expedient to make certain additions to, and alterations in, the Law of Patents for Inventions; be it enacted, therefore, &c.

2. The Lord Chancellor, the Master of the Rolls, the Attorney and Solicitor General for England, the Lord Advocate, the Solicitor-General for Scotland, the Attorney and Solicitor General for Ireland, for the time being, are to be appointed commissioners for patents of inventions. 3. The said commissioners may, from time to time, make orders and rules respecting applications for the making and issuing of letters patent, the filing, preserving, and publication of specifications and indices, and the allowance of memoranda of alterations, &c., and other matters relating thereto, and appoint their own officers, clerks, &c. 4. The petition for grant of patent shall be left at the Great Seal-office, and the subsequent patent shall be dated as of the date of such delivery. 5. The petition may be referred to such person or persons as the commissioners may direct, to consider and report thereon; and every report recommending the grant of letters patent shall be accompanied by a statement in writing of the nature of the invention, signed by the petitioner. 6. The commissioners, on receipt of the said report, may cause a warrant to be prepared for the sign manual of her Majesty; and such warrant, so signed, shall be a sufficient warrant to the Lord Chancellor for the making and sealing of the letters patent therein directed to be made. 7. It shall be lawful for the Lord Chancellor, on receipt of this warrant, to seal letters patent which shall be of force *throughout the united kingdom* of Great Britain and Ireland, the Channel Isles, and Colonies, provided always that such letters patent may be opposed, as heretofore, before the Lord Chancellor. 8. That it shall be lawful for her Majesty to cause all letters patent to be subject to a condition that the same shall be void, and cease, and determine at the expiration of three years and seven years respectively, from the date thereof, unless there be paid in respect of such letters patent before the expiration of the three and seven years respectively, or at such time as may be provided, the sum or sums, by way of stamp duty, in the schedule to this act mentioned (*i. e.*, £40 at the expiration of three years, and £70 at the expiration of seven years). 9. Specifications shall be under the control of the commissioners. 10. The Lord Chancellor and the Master of the Rolls shall make certain regulations with regard to memoranda and alterations, &c. 11. True copies of specifications of all letters patent, granted as aforesaid, and of disclaimers and memoranda of alterations, to be always open for public inspection at the Great Seal Patent-office. 12. The commissioners may direct the Queen's printer to print copies of specifications, and to sell the same at reasonable prices, and such printed copies shall be admissible in evidence (!). 13 and 14. Relates solely to filing memoranda of alteration and disclaimers, and are of no consequence. 15. Extends the provisions of the acts for extension of patents to patents hereafter to be granted. 16. Provides that the plaintiff in every action for infringement shall deliver particulars of the breaches he complains of, and so with regard to actions in *scire facias*. 17. Relates to the costs to be allowed in such actions. 18. Provides that the fees in the schedule named may be taken, and no others. 19. Provides that compensation may be given to persons whose interests are affected by this bill. Lastly. That the bill is to take effect one month after the passing thereof.

SCHEDULE.

Fees to be taken at the Great Seal Office.

	£	s.	d.
On leaving petition for patent for Great Britain and Ireland	10	0	0
On warrant for sign manual, and for letters patent for the United Kingdom	8	0	0
On filing specification of such letters patent and registration thereof	2	0	0
Registration of payment of further stamp duty before the expiration of the third year	0	5	0
The like on further payment of stamp duty of £70, before the expiration of the seventh year of such letters patent	0	5	0
For every search	0	1	0

Stamp Duties to be Levied.

On granting letters patent	10	0	0
Additional stamp duty to be paid on or before the expiration of the third year	40	0	0
Additional stamp duty on such letters patent, to be paid on or before the expiration of the seventh year from the date thereof	70	0	0

If we cannot give an unqualified approval to all the provisions of the bill which Lord Brougham has presented to the House of Lords for the amendment of the patent laws, it is only because we object to some few matters of detail, and would like to see some few deficiencies supplied. To the principle on which the bill is based we yield a willing assent, and we are much in hopes that the bill may become law, with the addition of such provisions as to us it seems to require. It is almost superfluous to say, that when Lord Brougham applies his vigorous intellect to the investigation of a subject, whether in pure science or in that of jurisprudence, the resulting deductions are sure to be in the main correct, if not always brilliant. In his instance he has seen at a glance the requirements of inventors, and has succeeded for the most part in meeting them by his bill. One of the great evils in connection with the practice of granting patents was the multiplicity of forms, the number of offices, and the fees payable at them; now Lord Brougham proposes to abolish all these useless forms, to shut up the superfluous offices, and to reduce to a great extent the fees and charges. Another objection was founded on the division of the United Kingdom in regard to patent rights. A separate patent for England, Ireland, and Scotland, is a manifest absurdity in these days, when, thanks to the rail and telegraph, the three countries are made one by better and more efficient means than the Act of Union. The bill proposes that a patent shall give protection to all those parts of her Majesty's dominions wherein, hitherto, such rights have been allowed, that is, in all her territories, save some insignificant colonies, and the possessions of the East India Company. One of the most urgent of the requisitions of patent reformers was for some means of obtaining protection from the date of the *application* for the patent: this is provided for in the bill under notice, which requires that the petition shall be accompanied by a statement in writing of the nature of the invention. It has been the theme of general complaint that poor inventors are debarred the opportunity of bringing their inventions into notice by reason of the great expense required in the first instance for procuring the patent. Lord Brougham thinks that £18 will not act as a denial to the meritorious inventor, and, by giving him time to pay the larger tax, he affords ample opportunity to the inventor to seek for that assistance which capital alone can give him. We must not be held to say that the stamp duties proposed to be levied are the precise sums which, under all the circumstances, may be considered equitable; but in this all must agree, that the sum proposed, £130, for a patent in the United Kingdom is nearer to equity than the tax now levied of £350. Among the many faults of our patent system have been the ruinous losses entailed by expensive litigation, more especially caused by the multifarious pleas which it has been the custom to make in actions for infringement of patent right, and in proceedings of *scire facias*, all of which the present bill endeavours to correct. For our own part we could wish that Lord Brougham had endeavoured to provide some special tribunal and special forms for the settlement of matters of this kind; but we are not disposed on this account to reject a measure which is decidedly the best which has yet been propounded. We question, however, the propriety of printing the specifications of patents, and much more the policy of admitting such printed copies as evidence in a court of law; but perhaps the noble lord may be induced to reconsider a part of his bill which would certainly establish a precedent by no means desirable in jurisprudence. We are only discharging a duty in tendering our best thanks to Lord Brougham for his well-timed efforts to amend the law of patents.

PAINE'S HYDRO-ELECTRIC LIGHT.—This gentleman was requested to exhibit his apparatus before a scientific committee in Boston, and declined, not assigning any reason for his refusal; lately, however, his brother has addressed a letter to a friend, in which he says that everything as stated has been correct, except its safety. The water is decomposed, or resolved in its gaseous state, in abundance, but nine severe explosions have proved that it cannot be safely used. The great difficulty is found in governing the electric currents in their accumulations and discharge in or at the electrodes—the continuous varying state of the atmosphere baffling all mechanical skill that has been brought to bear on the discovery. With a certain electrical state of the atmosphere the apparatus has been known to work well; but, immediately that a change of excess would occur, repulsion would take place at the electrodes, and they melted like wax. A few days previous to the examination, a cold clear morning, the decomposing jar exploded like a six-pounder, and, therefore, the experiment could not be tested. Mr. Paine, during the last eighteen months, has been endeavouring to remedy this evil; he believes he has now succeeded, but his friends fear another disappointment.

THE CANNEL COAL GASES.—The following report has been circulated by the Chartered Gas Company:—

"Gentlemen,—In compliance with your wishes, communicated to us by Mr. Evans (the superintendent), we have made a series of comparative experiments on the illuminating power of the cannel coal gas made at your works at Westminster, and upon that supplied by the Western Company. These experiments were made in the parish of

St. James, where we had an opportunity of availing ourselves of the separate service-pipes of the two companies. The experiments were continued for several successive days, and gave the following mean result, namely, that 898 cubic feet of the Chartered Company's cannel coal gas is equivalent, in illuminating power, to 1000 cubic feet of the Western Company's gas; and we further find that the cannel coal gas, as made at your works at Westminster, and purified by the patented processes, there adopted, *is perfectly free from sulphuretted hydrogen and from ammonia.*

"We have the honour to remain, gentlemen, your faithful servants,

"W. T. BRANDE, F.R.S., Professor of Chemistry,

"J. T. COOPER, Professor of Chemistry.

"To the Directors of the Chartered Gas Company."

FRAUDS IN THE COAL TRADE.—A cargo of cannel coal, purporting to be the celebrated Boghead cannel, was sold at the London Coal Exchange on the 12th ult., through the leading factors, to a highly respectable coal-merchant, and by him resold to a metropolitan gas company, with the following certificate of its origin:—

"7, St. Cuthbert Glebe, Edinburgh, February 25, 1851.

"*Clerk of the Coal Market, London.*—I hereby certify that I have shipped on board the Lark, Meikle Reed, master, seventy-eight tons of Blackhall and Boghead Parrot coals, wrought and gotten out of Blackhall and Boghead Colliery, at 17s. 6d. per ton.

"ARCHIBALD GRIEVE, Agent for Colliery."

Considerable variations in the quality of the coal was remarked on its delivery, and it was ultimately ascertained to be a mixed cargo, containing less than 25 per cent. of the genuine Boghead, and 75 per cent. of inferior cannel, scarcely worth the carriage and expenses. Gas companies cannot be too cautious against the repetition of such frauds, which may be effectually prevented by effecting their purchases direct from the coal-owners or through their recognised agents.

THE HYDRO-CARBON GAS AT SOUTHPORT.—At the usual fortnightly meeting of the Southport Improvement Commissioners, held on Tuesday last, a statement of the receipts and disbursements on the gas account was read, from which it appears that the cost of manufacturing the hydro-carbon gas, with the present consumption, including interest of money invested in the plant, materials, wages, wear and tear, and all other expenses, is 5s. 3d. per 1000 cubic feet. The present charge to the consumers is 6s. 8d. per 1000 feet.—*Manchester Courier.*

RETORTS AT THE GREAT CENTRAL GAS WORKS.—The *Artizan* for this month contains two copperplate engravings of the latest improvements in the apparatus for the conversion of olefiant gas into light carburetted hydrogen. The experiment of passing the former gas through a heated tube filled with incandescent charcoal is well known, and in the retorts above mentioned the operation is carried on upon an extensive scale.

THE CENTRAL GAS CONSUMERS' COMPANY AND THEIR CONTRACTORS.—A dispute of considerable magnitude has arisen between the directors of the Central Gas Consumers' Company, and Messrs. Rigby, the contractors, involving the amount of upwards of £30,000. We are not yet in possession of the particular points: there are claims on the part of the contractors, and counter claims on the other hand advanced by the company. We have heard that these will not be the subject at present of law proceedings, both parties being willing to submit their disputes to arbitration: this has been agreed to. Mr. Raikes Currie, M.P., having been appointed arbitrator, we trust that under his able management a solution of these complex difficulties may be arrived at, satisfactory to both parties; as, from the immense stake involved, and the numerous interests affected thereby, it cannot but be a subject of regret that such an important matter should remain in doubt.—*Mining Journal.*

THE MORNING CHRONICLE AND THE JOURNAL OF GAS LIGHTING. The following gratifying tribute to our impartiality from an advocate of the low-priced gas movements appeared in a late number of the *Morning Chronicle*:—"The first volume of this useful publication, consisting of the numbers published during the years 1849 and 1850, contains an immense mass of information of great interest to persons interested in its subject, and which it would be difficult for them to find elsewhere. The two years just passed have formed an era in the history and science of gas lighting, during which topics of vital importance were warmly discussed, and frequently with more zeal than discretion. On many of these topics Mr. T. G. Barlow, the editor of the JOURNAL OF GAS LIGHTING, no doubt expresses decided opinions, evidently founded on a studious investigation; but his columns appear to have been always open to a full and free discussion of every point on the part of his numerous correspondents. The journal is 'published quarterly, with an intermediate supplement on the 10th of each intervening month,' so that in effect it forms an excellent monthly *resumé* of every thing connected with the application of science and money to the manufacture of gas."

QUEBEC GAS COMPANY.—At the annual general meeting of the Quebec Gas Company, held on the 3rd ult., the following report was unanimously adopted and ordered to be published:—"The directors of the Quebec Gas Company, in submitting the fourth annual report to the stockholders, have much pleasure in informing them that the works have been fully completed, according to the original design, and that every part of them is now in thorough working order. The Gasholder house has been finished, and an additional tank and gasholder erected, which will at all times ensure to the city an abundant supply of gas, without danger of interruption. Since the last report there has been laid down, in various streets, as marked in the annexed table, 5393 feet of mains; 4984 feet of service-pipes; supplying 276 houses, and 24 public lanterns, and 400 feet from Champlain-street to the Citadel, making a grand total of pipes laid since the commencement of upwards of 9½ miles. The quantity of gas manufactured last year was 5,776,300 cubic feet. There are now 224 street lamps, and 603 private consumers, supplied by the works with gas of a superior illuminating quality. The City Council having, on the 5th July last, passed a resolution, that they would not contract for any addition to the number of street lamps, except at a reduced price, not to exceed £4 10s. each per annum, the directors agreed to furnish them at that rate, provided they would take not less than 100, and that the company should not be required to carry their pipes through rocky streets or other localities where there would be few private consumers, due regard being also had to the agreement with the council as to the stipulated distance at which the lamps should be placed, &c., as, without reference to these conditions, an expenditure might be incurred which even an extravagant price for lamps would not at all compensate. The directors apprehend that in offering these additional lamps at so low a price the shareholders may consider that they have been influenced more by a regard for the public convenience than the interest of the company, especially when they are informed that, by a careful calculation of all expenses, each lamp costs net £4 5s. 6d. per annum."

ROYAL INSTITUTION.

Dr. Faraday has recently delivered a series of highly interesting lectures at this institution to crowded and delighted audiences, charmed at the same time by the simplicity and effectiveness of the illustrious lecturer's style. The title of the series was, "Upon Some Points of Domestic and Chemical Philosophy," in which "a fire, a candle, a lamp, a chimney, a kettle, and ashes," form the matters to be illustrated, exhibiting the phenomena of combustion, and their results in their most ordinary modes. In treating of the fire, Dr. Faraday dwelt first on the different kinds of fuel, and divided them into two distinct classes—those which are fixed during combustion and enter into immediate combination with the supporters of combustion, and those fuels which require to be vapourized by heat before they can be burned. Of the first class, charcoal or carbon affords the best illustration, and the inflammation of ether was shown as an instance of vapourized fuel. In the result of combustion there are similar distinctions, some fuel burning without leaving any perceptible product, whilst others leave behind a tangible substance larger than the combustible before ignited. When charcoal, for example, was burned in oxygen gas it entirely disappeared, and nothing was visible, as it was converted into carbonic acid gas; phosphorus, on the other hand, formed a dense vapour in burning, and lined the inner surface of the glass with a thick coat of white matter. After briefly noticing the general characteristics of fuel and the products of combustion, Dr. Faraday proceeded to consider the construction of the fireplace, and exhibited the original models made by Count Rumford, in the Royal Institution, soon after its foundation, at which the first attempts at the formation of fireplaces on philosophical principles were made. Some of those models closely resemble the fireplaces at present in use, and it was observed that little useful improvement in them has been effected since Count Rumford's time. The principle he carried into practice was that of enclosing the fire within a small compass, to avoid the waste of heat up the chimney, and to place firebricks at the back and sides of the burning coal to increase the radiation of heat. In a common blazing fire the flame does not throw into the room one tenth part of the heat that proceeds from the hot cinders or coke, and this was explained to be owing to the greatly superior power of radiating heat which carbon possesses. Were it not, indeed, for the carbon contained in coal gas, the heat radiated from it would not be the tenth part of what it is. As examples of the power of radiation in carbon, several experiments were performed. A sheet of tin was blackened on one side, and half of it turned round, so as to present half of its polished and half of its blackened surface on each side. Pieces of phosphorus were stuck upon each, and then held near the fire; when the phosphorus on that half which presented its blackened surface to the fire was speedily inflamed, whilst the other piece was not sensibly affected. A highly-polished silver teapot was blackened on one side, and, being filled with hot water, was placed with its polished side close to the bulb of a differential thermometer, without any sensible increase of heat; but no sooner was the blackened side presented to the bulb than the liquid in the tube of the thermometer was seen to rise rapidly. It is this property which polished metallic surfaces possess, of being imperfect radiators of heat, that makes a metal teapot much better than a china one for extracting the strength of the tea, because it retains the heat longer. In considering the nature of flame, Dr. Faraday observed that we never see correctly the actual form of the flame rising from a bituminous coal fire. The air, which is always rushing towards the flame to supply the oxygen gas necessary for combustion, produces a flickering, unsteady motion, which breaks the flame into numerous branches, though these movements are so rapid that, owing to the property which the eye possesses of retaining the impression of an object for nearly the tenth part of a second after the object itself has vanished, the flame seems to be entire. It may, however, be readily visibly dissected by adopting a contrivance, by means of which the eye can see it only for the tenth part of a second. This is readily done by cutting a slit in a piece of card, and then moving it rapidly before the eye, when the flame seen through the slit appears to be cut into pieces. An ingenious contrivance was adopted for exhibiting this effect on a large scale, so that it might be seen in all parts of the lecture-room, the flame employed being that of gas, issuing from a large aperture. A similar effect was produced when the flexible tube that conveyed the gas to the burner was suddenly compressed in rapid succession, so as to check the supply of gas. The roaring of a flame when blown on is occasioned by a succession of small explosions; and, if a roaring flame be dissected in the manner described, it will be seen to be composed of numerous small flames, each one of which produces a small explosion, and the succession of these explosions occasions the continuous roaring sound. By placing upon the fire an iron tube, funnel-shaped at one end, a stream of coal gas issued from it, which was ignited. This was formerly called the spirit of the fire, and in the middle of the last century, long before the employment of gas for illumination, the gas issuing from such a tube had been collected in bladders by Dr. Clayton, and ignited as it issued from a hole

pricked in the membrane. This experiment, which was shown by Dr. Faraday, had a very curious effect, and must have appeared most wonderful before the properties of carburretted hydrogen were known.

His second lecture of the series was "Upon Some Points of Domestic and Chemical Philosophy"—the subject being "a candle." The professor first treated of the materials from which candles were made, and the processes of their manufacture, and then proceeded to consider the peculiar conditions requisite to form a candle, and the changes that ensue during its combustion. Specimens of wax, spermaceti, and of tallow, in their various stages of purification, were exhibited, and the processes of making spermaceti and wax candles were illustrated. The purpose of the plaited wick was explained to be to give it a twist as the candle burned, so that the wick may be kept at the verge of the flame, where the greatest heat is, and there be completely consumed, and by this means to avoid the necessity of snuffing. The mode of casting spermaceti candles in moulds, and of extracting them when cold, by giving each one a blow inwards, was shown; also the method of making wax candles by a succession of layers, no plan having hitherto been contrived by which wax candles can be cast in moulds. In making wax candles the operator has a number of long wicks fixed to a suspended horizontal hoop, and over these wicks he pours the melted wax, which cools as the hoop turns round. Having poured on as much wax as experience tells him is requisite, he cuts off the ends, reverses the position of the candles on the hoop, and repeats the operation of pouring, so that the candles may be of the same thickness at both ends. The requisite conditions of the materials of which candles are composed were stated to be that the combustible fuel should be solid; be of a nature to melt readily, but not too quickly; and that, when melted and carried to the flame by the capillary attraction of the wick, they should be convertible into carburretted hydrogen gas by the heat evolved. Several examples were given of the capillary attraction exerted by cotton, the most curious of which was the application of it for the combustion of potassium. A thick piece of wax was placed round a cotton wick, and touching the wick, at the top, was a piece of potassium. This was put into a plate containing water, which rose up the fibres of the cotton, and, coming into contact with the inflammable metal, ignited it. The necessity for the materials employed as candle fuel having the proper melting point was illustrated by showing the opposite qualities in gutta percha and in camphor. A piece of candle, made experimentally of gutta percha, burned like a link, the whole substance of the combustible taking fire, because the material does not melt readily; a camphor candle, on the contrary, melted too quickly, and the whole inflamed rapidly. In a well-formed candle, the wax, or tallow, is melted in the reservoir formed by the heat; the liquid fuel is conveyed by the wick to the flame, it is there converted into hydrogen gas, and by its inflammation sustains the series of continued combustions. The hydrogen gas flame has no illuminating property, though it possesses great heat, and the heat enables it to burn the carbon of the fuel, from which only the light of the flame is derived. In illustration of the fact that it is the incandescence of solid matter which produces the light of flame, Dr. Faraday introduced different substances into the almost invisible flame of hydrogen gas; of which lime, though itself incombustible, gave the most brilliant light. The Drummond light is, indeed, produced by the incandescence of lime exposed to the powerful effect of a jet of flame in which hydrogen and oxygen gases are combined. The flame of a candle is not, as it appears to be, a solid volume of fire, but consists of a hollow cone, with a thin layer of flame on the outside, where the evolved gas comes in contact with the air. The hollowness of the flame was shown by the following experiment:—A piece of writing paper was held horizontally in the middle of the flame until the back became scorched; but the mark of burning was not that of a disc, as it would have been had the flame been solid, but it formed a ring, in the centre of which the paper was not marked. Though in the ordinary burning of a candle we see little smoke, and no agitation of the air from the rising of the heated vapour and gas, if the shadow of the flame be thrown on a screen, by the rays of the sun or by a Drummond light, a very active process is perceived to be going on, which extends to a considerable distance round and above the flame. Dr. Faraday exhibited these effects by means of a Drummond light, which he employed in the first instance for showing the shadows of bubbles of carburretted hydrogen and of carbonic acid gases, thrown upon a screen. The bursting of these bubbles produced a curious and beautiful effect. When the bubble of carburretted hydrogen gas was burst, the shadows appeared broken into parts, and rose rapidly up the screen, the mixture of the gas with common air presenting the same striated appearance as the mingling of liquids of different densities. A similar appearance was produced on the bursting of the bubble blown with carbonic acid gas, but the movement was downward instead of upward, that gas being nearly twice as heavy as common air. When the flame of a candle was interposed between the light and the screen, the shadows of the smoke and of the vapour were seen rising perpendicularly for a considerable height, and a violent agitation was visible around. The remarkable phenomenon presented in these experiments, with which the lecture concluded, was, that they, in reality, "shadowed forth the forms of things invisible."

The third lecture of the series was "Upon Some Points of Domestic and Chemical Philosophy," which was honoured by the presence of Prince Albert. The subject illustrated was the philosophy of "a lamp"—it being the sequel to the one on a candle. In a lamp, as Dr. Faraday observed, the character of the combustion is the same as in a candle, but the fuel is generally liquid to begin with, and is not melted from a solid state and retained in a cup, beautifully excavated by the combined influences of the heat of the flame and the cooling property of the air, which rushes to it to support the continued combustion. The bright light of a candle, compared with that of a common lamp, is produced by the more perfect combustion of the melted fuel, in consequence of the wick being better adjusted to the supply of air. The thicker the wick the more dull the flame, because the larger quantity of fuel to be burned requires a greater supply of oxygen from the atmosphere than can be obtained at the surface of the flame, which alone comes in contact with the air in an ordinary lamp. With the view of supplying air to the interior of the flame, Argand made the wick circular, and admitted a current of air to the centre, by which arrangement, assisted by the glass chimney, which causes a greater current to impinge on the surface, the brilliant light of Argand lamps is produced. Though it is essential for the perfect combustion of the carbon of the oil that there should be a sufficient supply of air, yet, if air be introduced in too large a quantity, its cooling influence has an opposite effect, and the hydrogen gas is burned without even the formation of smoke, as witnessed in the action of a blowpipe. The heat of the hydrogen flame remains the same when the carbon is not consumed; and a method has been adopted, and is extensively practised in the arts, of directing a blast of air through a jet of gas, by which means a large and powerful blowpipe is formed, that is used for annealing and soldering silver and other metals in the process of manufacture. Dr. Faraday exhibited the power of such a blowpipe by heating red hot a silver vase which was in an unfinished state. He said it must be borne in mind that the light of flame depends on the burning or the incandescence of particles of solid matter, and to promote the combustion of the particles of solid carbon liberated from the oil is the object of all lamp arrangements. The quantity of carbon present in a flame at any one time is, however, exceedingly small, and does not amount to so much as is collected on a glass by holding it momentarily over the flame. The combustion of the carbon is more perfectly accomplished by the aid of pure oxygen gas, the effect of which in increasing the brilliancy of flame was exhibited. It was by this plan that Mr. Goldsworthy Gurney lighted the House of Commons with what was termed the Bude light. Dr. Faraday also exhibited the more brilliant appearance of the Drummond light, which is produced by the incandescence of lime exposed to the greater heat of a combined jet of oxygen and hydrogen gases. The admirable arrangements in lighthouses for collecting light and throwing it to great distances, horizontally, so that its power may not be dispersed unnecessarily, were much praised by Dr. Faraday, who exhibited several kinds of lights, fitted with reflectors and with lenses, by means of which a light may be seen at the distance of forty miles. The apparent opacity of flame is attributable to the vividness of the impression of the light on the retina, which obscures the fainter rays from objects beyond. Flame is, indeed, transparent, and its shadows, when exposed to a brighter light, is caused by the minute portion of unconsumed carbon contained within it. The fact of the transparency of flame may be proved by seeing through it objects lighted by the direct rays of the sun, and the same effect was exhibited by means of the Drummond light—an engraving when so illuminated having been made visible through a batswing flame of gas. The practical result to be derived from this consideration of the overpowering effect upon the eye of too brilliant a light is that, in lighting a large room, it is much better to have a number of small lights dispersed about than to have a strong and dazzling light in the middle. The properties of flame, and the effect of cooling influences on it, were successfully studied by Sir Humphry Davy, and applied practically in the safety-lamp. The wire gauze, within which the flame of a Davy lamp is enclosed, prevents the inflammation of the explosive gas within from communicating to the surrounding explosive atmosphere, because the flame is cooled by the wire below the point at which the gas can inflame. The effect of the lamp when burning in an inflammable gas was shown by introducing it into a glass vessel filled with the vapour of ether. The flame appeared to be nearly extinguished, though, in fact, combustion was going on at the surface of the gauze; and when the lamp was removed from the vapour the wick rekindled. Previous to the invention of the safety-lamp, miners worked in dangerous parts of the mine by the feeble light afforded by what is called a steel mill, which is an instrument so contrived that, by the rotation of pieces of steel striking against flint, a succession of sparks is produced. These mills are now so completely disused that on a late occasion, when one was wanted as a specimen for the Museum of Practical Geology, that in the Royal Institution was borrowed for a model to construct one, as none could be found in the coal districts of the north. At the conclusion of the lecture Prince Albert spoke to Dr. Faraday before he withdrew.

The subject of Dr. Faraday's fourth lecture was "a chimney." The importance of chimneys, and the great work they perform in clearing away, not only the products of combustion, but the air vitiated by respiration, were strongly insisted on, and numerous illustrations were presented for the purpose of showing the amount of work done by a chimney. A parlour fire will consume in twelve hours 40 lbs. of coal, and the combustion of that weight of fuel will vitiate 42,000 gallons of air, so as to be unfit to support life. Not only is that large amount of deleterious products carried away and rendered innoxious by the chimney, but five times that quantity of air is also carried up by the force of the draught, by which means the ventilation of our apartments is effectually maintained. The actual weight of matter, indeed, that ascends a chimney in the course of twelve hours exceeds 2000 lbs. To show how the expansion of the air operates in causing the ascent of smoke up a chimney, Dr. Faraday heated a glass tube closed at one end, and then inverted it in a dish that contained coloured liquid, which ascended the tube several inches as soon as the air expanded by the heat contracted by being cooled. The height to which the liquid rose showed the quantity of air that had been expelled from the tube by heat; consequently, that the column of heated air was so much lighter than an equal column of cold air. Several experiments were exhibited for the purpose of showing the force exerted by the draught caused by the ascending column of heated air in a chimney, among which was an illustration of a descending flue. A coloured flame was held near the end of a tube that was bent like an inverted syphon. As soon as the tube was heated, the ascent of the air within the longer arm of the tube drew the flame downwards into the shorter arm with considerable

(*Continued on last page but one.*)

Share List.

THE PRICES QUOTED ARE THOSE AT WHICH THE LAST SALES HAVE BEEN MADE.

The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£	**ENGLAND.**	£ s. d	£ s. d	£ s. d
		Aberdare			
		Aberystwith			
		Abingdon			
		Accrington £7000		5 0 0	
		Alcester			
		Alford, Lincolnsh.			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0	4 0 0	
		Amlwch			
160	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	6 0 0	11 0 0
		Appleby			
		Arundel			
		Ashbourn, Derby			
		Ashburton			
		Ashby-de-la-Zouch			
		Ashford, Kent			
		Ashton-under-Line £39,700		10 0 0	
		Atherstone			
		Axminster			
225	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk			
		Bacup, Yorkshire			
		Bakewell			
		Baldock			
140	25	Banbury	25 0 0		
		Bangor			
500	5	Barking, Essex	4 10 0	5 11 0	5 0 0
250	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnet			
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	7 10 0	25 0 0
		Barton			
120	25	Basingstoke	25 0 0	8 0 0	28 0 0
2400	20	*Bath*	16 0 0	6 0 0	25 to 30
		Battle £2000		6 0 0	
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beaumaris			
		Beccles, Bungay, and Lowestoft			
		Bedford			
		Bedworth			
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
		Berkhempstead			
700	5½	Berwick-on-Tweed	5 10 0	6 8 0	5 15 0
		Beverley			
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
160	10	Bicester	10 0 0	5 0 0	10 0 0
		Bilston £15,100		6 10 0	
		Billericay			
		Bingley £7400		4 0 0	
		Birkenhead and Claughton £70,000	35 0 0	3 0 0	32 to 34
2400	50	*Birmingham and Staffordshire*	50 0 0	8 0 0	93 to 94
	25	*Ditto*, new shares	7 10 0	8 0 0	12 0 0
704	75	*Birmingham*	75 0 0	9 0 0	140 to 141
		Bishop's Auckland			
		Bishop's Stortford			
		Blackburn £30,000		10 0 0	
		Blandford			
		Blythe			
		Bodmin			
		Bognor			
		Bolton £38,582		9 19 5	
		Boroughbridge			
		Boston £8000		10 0 0	
200	10	Bourn	10 0 0	5 0 0	
		Brackley			
		Bradford, Wilts			
		Bradford, Yorksh. £45,000		9 10 0	
		Brampton, Cumb.			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
		Brierly Hill			
2250	20	*Brighton*	20 0 0	5 0 0	14 to 15
1125	20	,, new shares	16 0 0	5 0 0	
		Brighton and Hove £50,276			
4250	20	*Bristol*	20 0 0	9 0 0	37 0 0
1725	25	*Bristol and Clifton*	25 0 0	6 0 0	25 0 0
		Brixham			
		Braintree			
750	50	*Brentford*	50 0 0	6 0 0	44 to 46
800	25	,, new shares	11 0 0	6 0 0	11 0 0
		Brentwood			
		Bridgwater £6000		5 0 0	
400	10	Bridlington	10 0 0	5 0 0	10 0 0
		Bridport			
		Brigg			
100	50	Bromley, Kent	50 0 0	6 0 0	52 10 0
		Bromsgrove			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
100	25	Buckingham	25 0 0	5 0 0	25 0 0
		Bungay (see Beccles)			
		Burford			
		Burnley £19,946		4 10 2	
		Burslem			
		Burton-on-Trent			
		Bury, Lanc. £6570			
		Bury St. Edmund's £10,500		5 0 0	
		Buxton			
		Callington			
		Calne, Wilts			
		Camborne			
		Cambridge £34,560		9 0 0	
240	50	*Canterbury* Gas and Water	50 0 0	6 0 0	57 to 58
240	25	*Ditto*, second issue	25 0 0	6 0 0	28 to 29
		Cardiff £12,000		7 10 0	
		Carmarthen			
		Chapel on the Frith			
		Chard			
		Chatham (see Rochester)			
		Chatteris			
		Cheadle			
		Chelmsford			
		Cheltenham £18,732		8 10 0	
		Chepstow			
		Chertsey			
230	10	Chesham, Bucks	10 0 0		
		Chester			
		Chester-le-Street			
		Chesterfield £13,123		4 17 6	
240	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
		Chirk			
		Chorley			
		Chudleigh			
		Cirencester			
		Clifton (*Bristol and Clifton*)			
		Cleckheaton, York.			
		Clitheroe			
		Cockermouth			
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
		Coggeshall			
		Congleton £5000		5 0 0	
		Cowbridge			
800	25	*Coventry*	25 0 0	6 0 0	20 0 0
		Cowes			
		Crewkerne			
		Croydon ... £20,000		5 0 0	
		Cranbrook ... £1900		5 0 0	
		Crediton			
		Crewe, Cheshire			
		Cricklade			
		Darlaston			
		Darlington			
250	20	Dartford	20 0 0	7 10 0	27 0 0
		Dartmouth			
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Shrop.			
		Dawlish			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	Deptford	10 0 0	5 0 0	4 10 0
325	50	*Derby*	50 0 0	10 0 0	
90	20	Dereham (East)	20 0 0	4 10 0	
1000	5	*Dewsbury*	5 0 0	10 0 0	8 12 6
		Devizes			
4000	5	*Devonport*	5 0 0	6 0 0	6 5 0
		Doncaster			
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	20 10 0	5 0 0	21 10 0
		Douglas, Isle of M.			
209	56½	*Dover*	56 10 0	4 15 4	55 0 0
		Downham			
		Driffield			
		Droitwich			
600	20	*Dudley*	20 0 0	4 0 0	15 to 16
		Dunmow			
		Dunstable			
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
		East Grinstead			
		Elland			
		Ellesmere			
		Enfield			
300	19	Epsom and Ewell	19 0 0		
		Evesham			
		Exeter £40,000		10 0 0	
		Exmouth			
		Eye, Suffolk			
64	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
		Fareham			
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
		Ferrybridge			
		Fleetwood			
		Folkestone			
		Fowey			
240	5	Framlingham	3 10 0		
		Frome			
		Garstang			
		Gillingham, Dorset			
		Glastonbury			
		Glossop ... £10,000		9 0 0	
		Gloucester £25,000		7 10 0	
		Gomersal			
		Godalming			
		Gosport			
		Grantham			
1600	20	Gravesend	20 0 0	5 0 0	21 0 0
1000	10	*Great Grimsby*	8 0 0	8 0 0	10½ to 11
	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hales Owen			
300	6	Halesworth	6 0 0	7 10 0	5 10 0
		Halifax £15,000		10 0 0	
		Halstead			
		Hampton Court			
		Harrogate £10,000		5 0 0	
		Hartlepool £15,137		7 10 0	
		Haslingden, Lansh.			
330	50	Hastings and St. Leonard's	50 0 0	6 0 0	60 0 0
		Haverfordwest			
		Haverhill			
		Haworth, Yorks.			
		Hayle			
		Helstone			
		Hemel Hempstead			
300	10	Henley-on-Thams.	10 0 0		
		Hereford £5300		4 0 0	
		Herne Bay			
270	10	Hexham	10 0 0	7 0 0	12 0 0
		Heywood £10,000		5 0 0	
		Highworth (Wilts)			
230	10	Hinckley	10 0 0	5 0 0	7 0 0
		Hindley, Lancash.			
		Hitchen			
		Hythe			
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see British Provincial)			
		Honiton			
		Horncastle			
10		Houghton-le-Spg.	10 0 0	8 0 0	
		Horsham			
		Howden			
		Hull, Sculcoats (see British Provin.)			
		Hull, £11,712. 10s.		5 0 0	
		Hunmanby			
210	10	Hungerford	10 0 0	5 0 0	10 0 0
		Huddersfield			
520	5	High Wycombe	5 0 0		5 0 0
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
1400	10	*Ipswich*	10 0 0	8 0 0	15 0 0
1400	10	,, new shares	5 0 0	8 0 0	
800	25	*Isle of Thanet* (Ramsgate&Mar.)	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
		Kenilworth			
		Keswick			
		Kettering	25 0 0	5 0 0	25 0 0
100	25	*Kiddermins.* £10000		5 0 0	
		King's Langley			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, nr. Preston			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
		Leamington Priors £22,500		6 0 0	
		Leatherhead			
		Ledbury			
		Leeds Old Comp. old stk., £60,300		10 0 0	
		new ,, £23,775		6 0 0	
		Leeds New £60,000		10 0 0	
		Leek			
		Leicester ... £36,230		7 0 0	
		Leigh			
125	20	Leighton Buzzard	20 0	5 0 0	
		Leominster			
		Leyburn, Yorksh.			
330	25	Liskeard			
		Lewes	25 0 0	5 0 0	23 0 0
		Lincoln £8000		10 0 0	
		Leyland, Lancash.			
		Littlehampton			
250	20	Lichfield	20 0 0	7 10 0	27 10 0
		Liverpool United	100 0 0	9 0 0	174 to 176
		,, ¼ sh.	25 0 0	9 0 0	43¼ to 43½
		Langport			
5000	40	London Comps.—*British*	18 0 0	5 0 0	12 to 13
		,, debentures £46,300		4 0 0	
5000	20	,, Provincial—(Gloucester, Holywell, Hull, Norwich, Stoke, Trowbridge)	20 0 0	7 0 0	18½ to 19½
	20	,, Prov., new	8 0 0	7 0 0	5 to 7
	25	*Commercial*	25 0 0	6 0 0	23½ to 24½
	25	,, new shares	15 0 0	6 0 0	part to dis
	25	,, ,,	2 10 0	6 0 0	part to dis
12,000	50	*Chartered*	50 0 0	6 0 0	45 to 47
6000	50	,, new shares	10 0 0	6 0 0	9 to 9½
2000	150	*City of London*	150 0 0	4 0 0	140 to 150
4000	50	*Equitable*	50 0 0	2 10 0	29 to 30
		,, debentures £46,000			
10,000	20	European—(Amiens, Boulogne, Caen, Havre, Nantes, and Rouen)	20 0 0	5 0 0	10 to 12
	20	,, do. new	5 10 0	5 0 0	3½ to 4

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
15,000	10	Gt.Cntl.Consumers	10 0 0		
8000	50	*Impl.Continental*—(Amsterdam, Aix-la-Chapelle Antwerp, Berlin, Bordeaux, Brussels, Cologne, Frankft., Ghent, Haarlem Hanover, Lille, Marseilles, Rotterdam, Toulouse, Vienna)	42 0 0		40 to 45
7000	50	„ new shares	41 0 0		50 to 55
	50	„ third issue	42 10 0		40 to 45
10,000	50	*Imperial*	50 0 0	6 0 0	69 to 71
3000	50	„ new shares	35 0 0	6 0 0	50 to 52
		„ debentures £50,500			
4000	40	*Independent*	40 0 0	6 0 0	41 to 42
3000	50	*London*	50 0 0		7 to 9
6000	25	„ preference	7 10 0	6 0 0	7¼
3000	50	„ 2nd do.	50 0 0		18 to 20
9000	50	*Phœnix*	49 0 0	4 10 0	27 to 29
1000	100	*Ratcliff*	90 0 0	5 0 0	58 to 60
4000	25	*South Metrop.*	25 0 0	6 0 0	23 to 24
9000	50	UnitedGeneral—(Cork, Dublin, Limerick)	50 0 0	2 0 0	15 to 15½
12,500	20	Western	18 0 0		7 0 0
		Lostwithiel			
		Loughborough			
240	25	*Louth*	25 0 0	6 0 0	26 10 0
		Lowestoft (see Beccles)			
611	5	Ludlow Union	5 0 0	6 0 0	5 0 0
		Luton			
		Lutterworth			
		Lyme Regis			
		Lymington			
		Malmesbury			
		Macclesfield £2,000		3 15 0	
		Maidenhead			
300	50	*Maidstone*	50 0 0	10 0 0	90 0 0
		Maldon			
		Marlborough			
		Malton (New)			
		Malvern			
		Manningtree			
		Mansfield £5000		10 0 0	
		March			
		Margate (see I. of T.			
		Market Deeping			
		Market Drayton			
132	25	Market Harboro'	25 0 0	6 0 0	30 0 0
		Market Raisin			
		Market Weighton			
		Marlow			
370	10	Maryport	10 0 0	6 0 0	12 0 0
		Melksham			
		Melton Mowbray			
		Merthyr Tydvil			
		Mere			
		Middleton £903		5 0 0	
		MidsummerNorton			
		Middlesboro'			
		Mildenhall			
		Mitcham			
		Mold			
700	10	Monmouth Gas and Water	10 0 0	5 0 0	
		Monk Wearmouth			
		Moreton in Marsh			
		Morley			
		Mottram			
		Nantwich			
		Neath			
		Needham Market			
		Newark £5000		10 0 0	
250	20	Newbury	20 0 0	5 0 0	20 0 0
13,000	5	Newcastle & Gateshead Union	5 0 0	8 0 0	6 12 6
		Newcastle-under-Lyne £6200		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	5 0 0
		Newnham, Glost.			
		Newent			
		New Mills & Hayfield £2115			
		Newport, M. £11720		8 0 0	
320	50	*Newport, Isle of W.*	38 0 0	4 0 0	19 to 20
		Newport Pagnell			
		Newport, Salop			
		Newton Abbot			
		Newton, Lanc.			
		Northallerton			
		North Walsham			
542	20	*Northampton*	18 0 0	10 0 0	27 0 0
		Northwich			
		Norwich (see British Pro. £40,000		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
900	50	New shares		10 0 0	
		Nuneaton			
		Oakham			
		Oakhampton			
200	10	Odiham, Hants	10 0 0	3 10 0	10 0 0
		Oldham			
		Ongar			
		Ormskirk			
		Otley, Yorkshire			
		Oundle			
		Oxford £18,000		9 10 0	
		Over Darwen £8000		5 0 0	
		Padstow			
		Pately Bridge, Yrk.			
250	20	Penrith	15 0 0	6 10 0	21 0 0
		Penryn			
		Penzance			
200	10	Petworth	10 0 0	8 0 0	12 0 0
		Pickering			
3000	10	*Plymouth & Stonehouse*	10 0 0	6 0 0	11 0 0
		Pocklington			
		Pontefract			
		Pontypridd			
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc			
600	50	*Portsea Island*	53 0 0	5 0 0	45 to 47
400	10	Prescott	9 0 0	4 13 4	7 0 0
		Preston £52,500		10 0 0	
		Pwllheli			
		Pudsey £12,000		5 0 0	
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate (see Isle of Thanet)			
		Ravenglass			
1000	10	*Reading*	10 0 0	3 0 0	7 0 0
500	20	*Reading Union*	20 0 0	6 0 0	17 0 0
		Redditch			
		Redruth			
		Reigate			
		Retford (East)			
		Rhyl			
		Richmond (Surrey)			
		Ripon			
		Rochester and Chatham £20,000		6 0 0	
		Rochford			
		Rockingham			
		Romford			
		Ross			
245	25	*Rotherham*	25 0 0	6 0 0	40 10 0
		Royston			
		Ruabon			
		Rugby			
		Rugeley			
		Runcorn £11,000		7 10 0	
		Ruthin			
500	10	Ryde	10 0 0	6 0 0	12 0 0
		Rye			
		Romsey			
		Saddleworth			
225	20	Saffron Walden	20 0 0	3 15 0	19 0 0
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St. Helier's Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St. Peter's Port, (Guernsey)			
320	25	Salisbury	25 0 0	6 0 0	28 to 30
		Sandbach			
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough			
		Seaham Harbour			
		Selby			
		Settle			
290	10	Sevenoaks	10 0 0	5 0 0	10 0 0
		Shaftesbury			
5400	25	*Sheffield United*	24 0 0	8 6 8	35 0 0
		Shelton, Potteries (see Brit Prov.)			
		Shepton Mallet			
		Sherborne			
2914	5	Shields, North (Tynemouth)	5 0 0	3 0 0	5 0 0
		Shields (South)			
		Shiffnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	5 12 6
		Shipston-on-Stour			
		Shoreham			
		Shrewsbury £10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
250	10	Sleaford			
		Slough	10 0 0		
		Snaith			
		Soham			
		Southwold			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
		Sowerby, Yorksh.			
		Stretford			
		Stokesly			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bridge £15,000		10 0 0	
		Stamford £11,250		3 0 0	
		Stockton-on-Tees £7980		9 5 0	
840	9½	Stockton, New	9 10 0	9 0 0	8 0 0
960	10	Stoke-upon-Trent	10 0 0	5 10 0	10 0 0
500	10	„ new shares	4 0 0	5 10 0	10 0 0
		Stone, Stafford			
		Stones Stratford			
		Stourbridge			
		Stowmarket			
150	20	Stratford-on-Avon	20 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury			
		Sunderland, old			
6400	5	*Sunderland*, new	5 0 0		
		Sutton			
		Swindon			
2800	5	*Taunton*	5 0 0	None	2 10 0
		Tadcaster			
		Tamworth			
		Tavistock			
		Teignmouth			
		Tenbury			
		Tenby			
		Tenterden £2000		2 10 0	
		Tetbury, Gloster			
		Tewkesbury			
		Thame			
		Thetford			
		Thirsk			
		Thornbury			
		Thorne			
		Tiverton			
670	5	Todmorden	3 0 6		
		Torquay			
		Torrington, Devon			
		Totnes			
		Totnes and Bridgetown Consumers			
4000	5	Tottenham	3 10 0	6 0 0	3 0 0
		Towcester			
		Tring			
		Trowbridge (see British Provin.)			
75	50	Truro	50 0 0	2 0 0	
		Tunbridge			
		Tunbridge Wells			
		Ulverston			
		Uppingham			
240	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk, Monmouth			
		Uttoxeter			
		Uxbridge			
1000	25	*Wakefield*, old capl	25 0 0	6 0 0	25 0 0
1600	5	new „	5 0 0	6 0 0	5 0 0
300	10	Wallingford	10 0 0	5 0 0	8 0 0
		Wandsworth			
		Wantage			
		Warrington £23304		10 0 0	
100	10	Wareham	10 0 0	3 10 0	8 0 0
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford			
		Welchpool, Mntgy.			
		Wellingborough			
		Wellington, Salop			
		Wellington, Smrst.			
		Wells, Smrst. £5000		7 10 0	
		Westbury			
		Weston-sup.-Mare			
2000	5	West Ham	5 0 0	6 0 0	5 0 0
		Whitby			
		Whitehaven			
		Whitstable			
		Whittlesea			
		Wigan £10,160		12 10 0	
		Willenhall			
		Winchelsea			
		Winslow			
240	10	Wimborne Minster	10 0 0		
		Wincanton			
350	50	Winchester	50 0 0	6 0 0	
900	12½	Windsor	12 10 0	10 0 0	23 0 0
		Witham			
		Witney			
4448	10	*Wolverhampton*	10 0 0	7 0 0	15 0 0
		Woburn			
210	10	Wokingham	10 0 0		10 0 0
		Woodbridge			
		Wooler			
		Wotton-un.-Edge			
		Worcester £29,000		8 0 0	
		Workington			
		Worksop and Radford			
		Wirksworth			
		Worthing			
		Wrexham			
		Woolwich			
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham			
		Yarm			
795	20	Yarmouth	20 0 0		15½ to 16½
		Yeadon, near Leeds			
		Yeovil			
		York Untd. £55,000		7 0 0	
		SCOTLAND.			
		Aberdeen			
		Airdrie			
		Alloa			
		Annan			
		Anstruther			
		Ardrossan			
550	20	Arbroath	20 0 0	7 10 0	7 10 0
		Auchterarder			
750	2	Auchtermuchty	2 0 0	6 0 0	2 10 0
		Ayr, old			
		Ditto, new			
		Banff			
		Barrhead			
		Bathgate			
		Beith			
		Bervie			
		Biggar			
		Blairgowrie			
350	6	Borrowstowness	6 0 0	5 0 0	8 0 0
		Brechin			
		Bridge of Allan			
		Broughty Ferry			
		Burntisland			
		Callen			
		Campbelton			
		Clackmannan			
		Coatbridge			
		Coldstream			
		Collinsburgh			
		Crieff			
		Crail, Fife			
		Cumbernauld			
		Cumnock			
600	5	Cupar Angus	5 0 0	6 0 0	5 10 0
250	10	Cupar Fife	10 0 0	7 10 0	14 0 0
		Dalkeith			
		Dingwall			
		Dornoch			
		Douglas			
		Dumbarton			
400	20	Dumfries	14 0 0	5 0 0	20 0 0
		Dunbar			
		Dunblane			
		Dundee, old £29,687		4 4 0	

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Dundee, nw	£33,851	2 10 0	
860	10	Dunfermline	10 0 0	6 0 0	12 12 0
		Dunkeld			
		Dunse			
		Dysart			
6000	25	*Edinburgh Gas Co.*	25 0 0	10 0 0	45 0 0
		„ *and Leith Co.*			
		£98,640		6 10 0	
		Elie			
		Elgin			
		Falkirk, old			
		„ new			
		Falkland			
		Ferry Port on Craig			
		Fochabers			
		Forfar			
		Fort William			
		Fraserburgh			
		Galashiels			
		Garlieston			
		Gatehouse n. Fleet			
		Girvan			
		Glasgow £122,500		7 10 0	
15000	10	*Glasgow City and Suburban*	9 0 0	6 10 0	9 0 0
		Grangemouth			
		Grahamston			
		Haddington			
		Hamilton £7500		8 0 0	
		Hawick			
		Helensburgh			
		Huntly			
		Inverary			
400	1	Inverkeithing	1 0 0	5 0 0	1 0 0
1200	10	*Inverness Gas and Water*	10 0 0	5 10 0	15 0 0
2400	5	„ new shares	1 5 0	5 10 0	2 5 0
		Irvine			
		Jedburgh			
		Johnstone, near Paisley			
		Keith			
		Kelso			
		Kilmarnock			
		Kincardine			
		Kinghorn			
		Kingskittle, Fife			
		Kinross			
		Kirkaldy			
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near Glasgow	3 0 0	5 0 0	3 0 0
227	5	Kirkwall	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Largo, near Leven			
		Largs			
		Lasswade, n. Edin.			
		Lauder			
		Leith			
		Leslie, Fife			
		Lesmahago			
		Leven			
		Liulithgow			
		Linton, n. Nobleh.			
		Lochee, n. Dundee			
		Lochgilphead			
		Lochwinnock, near Paisley			
1200	1	Markinch	1 0 0	7 10 0	1 5 0
		Mauchline			
		Maxwell-town, n. Dumfries			
		Maybole, Ayrshire			
		Maryhill, near Glasgow			
		Melrose			
718	2	Mid & East Calder	2 0 0		2 0 0
192	5	Moffat	5 0 0		
	13½	Montrose	13 10 0	7 11 1	
		Musselburgh			
		Nairn			
		Neilston, n. Glasg.			
		Newmills, near Kilmarnock			
		Newburgh, Fife			
		Newton Stewart			
		North Berwick, n. Haddington			
		North Queensferry			
		Oban			
		Peebles			
800	25	Perth	25 0 0	4 16 0	22 10 0
		Peterhead			
		Pittenweem			
		Pollokshaws, near Glasgow			
		Port Glasgow			
		Portobello, near Edinburgh			
		Prestonpans			
		Rutherglen, near Glasgow			
		Renfrew, n. Paisley			
		Saltcoats			
		Sanquhar			
		Selkirk			
		South Queensferry			
		St. Andrew's			
		Stewarton			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Stirling			
		Stoneheavn			
		Stonhouse, Lanrks.			
		Stornoway			
		Stranraer			
		Strathaven, near Hamilton			
		Thurso			
		Tillicoultry, n. Alloa			
800	1	Tranent	1 0 0		1 0 0
		Troon			
		Wick			
		Wigton			
		Wemyss	4 10 0		
		IRELAND.			
300	10	Armagh	10 0 0	8 0 0	14 10 0
		Ballinasloe			
700	50	*Belfast*	50 0 0		
		Ballymena			
		Ballymoney			
		Carrickfergus			
		Carlow, new			
		Cork (see Un. Gen.)			
		Clonmel Consumrs			
		Drogheda			
19,000	10	*Dublin Consumers*	5 0 0	7 0 0	6 0 0
		Dublin Hibernian (see United Gen.)			
160	25	Dundalk	25 0 0		22 0 0
		Dungannon			
1000	5	*Downpatrick*	5 0 0		
		Enniskillen			
		Galway			
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Larne			
		Limerick (see U. G.)			
1725	5	Limerick Consum.	5 0 0	5 0 0	5 0 0
600	15	Londonderry	15 0 0	6 13 4	21 10 0
500	7	Lisburn	7 0 0	6 5 0	7 0 0
520	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
418	5	Newtownards	5 0 0	4 0 0	5 0 0
		New Ross			
		Newry			
		Omagh			
125	20	Portadown	20 0 0	6 0 0	20 0 0
600	10	Sligo	10 0 0		
		Tipperary			
		Tralee			
		Waterford			
		Wexford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Ely.	Hertford.	Morpeth.	Sheerness.	Ware. (2 works)
Bridgenorth.	Farsley.	Holt.	Oswestry.	Sidmouth.	Wem.
Carlow, old.	Gainsborough.	Huntingdon.	Peterborough.	Sittingbourne.	Weymouth.
Carnarvon.	Goole.	Hyde (Cheshire)	Pontypool.	Spalding.	Whitchurch (Salop).
Deal.	Harleston.	Kingston-on-Thames.	St. Alban's.	Waltham Abbey.	Wisbeach.
Diss.	Hatfield.	Lynn.	Sandwich.		

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Carlisle.	Keighly.	Milton (Kent).	Rothesay.	Southport (Lanc.)	Walsall.
Cashel.	Knaresborough.	Paisley.	Richmond (Yorkshire).	Stockport	Wells (Norfolk).
Coleraine.	Lytham (Lanc.)	Rochdale.	Salford.	Strabane.	Youghall.
Greenock.	Manchester.				

Price Current.

The following List of Prices is corrected by an eminent wholesale house in each trade up to the latest period:—

CASTINGS, per Ton.

Average Weight of Cast Iron Pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffrdsh
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1.	3 7 6	2 10 0	3 0 0	3 15 0	3 10 0
1¼ and 2 inches Socket Pipes	6 0 0	5 0 0	5 10 0	5 15 0	5 15 0
2½ and 3 do. do.	5 17 6	4 17 6	5 7 6	5 12 6	5 12 6
4 and 5 do. do.	5 15 0	4 15 0	5 5 0	5 10 0	5 10 0
6 inches and upwards do.	5 12 6	4 15 0	5 2 6	5 7 6	5 7 6
Extra for bends, branches, and connection	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0
Retorts, 1st fusion	5 5 0	..	..	4 17 6	5 0 0
Do. 2nd fusion	5 15 0	4 10 0	4 17 6	5 5 0	5 5 0
Tank Plates, ¾ thick and above	5 10 0	4 17 6	5 0 0	5 7 6	5 17 6
Do. less than ¾	5 15 0	5 0 0	5 0 0	..	5 10 0
Plain Castings ex. models	5 15 0	5 0 0	5 0 0	5 10 0	5 10 0

COALS.

NEWCASTLE. Unscreened.	s. d.	
Tyne Main	5 6	per ton.
Ravensworth Pelaw	5 9	„
Dean's Primrose		
Pelton		
Brancepeth	6 0	„
Medomsley		
New Tanfield		
Pelaw	6 3	„
Eighton Moor		
Felling Main		
New Pelton		
Peareth	6 6	„
South Pelaw		
Waldridge		
South Peareth		
Ramsay's Cannel	12 0	„
Cowen's Cannel	12 0	„

DERBYSHIRE. Unscreened.	s. d.	
Clay Cross	6 6	per ton.
Deep Main		
New Birchwood		
SCOTCH CANNEL.		
Kirkness best	23 0	„
Boghead	21 0	„
Capeidrae, first quality	20 0	„
Ditto, second quality	10 0	„
Lothian	18 0	„
Lesmahago at Glasgow	16 6	„
Ditto at Leith	18 0	„
Wemyss	15 0	„
Donibristle	10 6	„
Bridgeness	11 0	„
Kinneil		
Lochgelly	9 6	„
Lumphinan		

FIRE GOODS.

Best Bricks, 50s. per 1000, at Newcastle.
Do. Clay, 12s. per ton do.

LEAD.

Sof. pig, £18. 10s. per ton.

WROUGHT IRON TUBING, subject to 40 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 4 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto „ 2 to 4 feet	One penny		per foot extra.			
Ditto „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Flanches	1 9	1 6	1 3	1 0	0 9	
Syphons, 3 quart	15 0	14 0	13 6	13 0	12 0	

FREIGHTS, per Ton.

Coastwise—Newcastle.	s. d.		s. d.
Chatham & Roches.	5 9	Weymouth	7 3
Cork	8 6	Yarmouth	4 9
Dover	5 9	*Foreign.*	
Dublin	9 0	Amsterdam	8 0
Exeter Quay	8 0	Boulogne	6 9
Folkestone	6 0	Barcelona	17 6
Hastings	7 6	Bordeaux	10 9
Ipswich	5 3	Calais	6 9
Jersey	7 0	Dieppe	7 3
London	5 3	Hamburg	7 0
Lowestoft	4 6	Havre	8 3
Lynn	5 9	Lisbon	10 6
Margate	6 0	Rotterdam	7 3
Portsmouth	7 0	Rouen	10 6
Plymouth	7 3	St. Petersburgh	9 6
Southampton	7 0	Stettin	8 6
		Trieste and Venice	21 0